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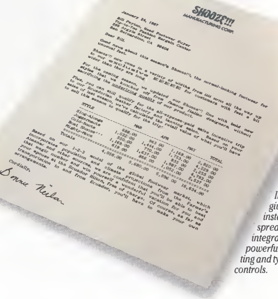
With InWord, automatic mailmerge is as easy as selecting range from your 1-2-3 spreadshe database.



SHOOZE'!!
MANUFACTURING CORP.

January 24, 1987

Bill Peyton, Head Footwear Buyer
Tip-to-Toe Fashion Bargain Center
299 Argyle Street
San Bernardino, CA 92404

Dear Bill,

Good news about this season's Shooze'!!, the normal-looking footwear for unusual feet.

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STYLE	MAR	APR	MAY	TOTAL
Slog-Alongs	588.00	963.00	1,169.00	2,920.00
Joggernauts	1,032.00	1,444.00	1,753.00	4,229.00
Cold-Boots	550.00	770.00	935.00	2,255.00
Boat Shooze'!!	1,169.00	1,637.00	1,987.00	4,793.00
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Totals	4,058.00	5,680.00	6,896.00	16,634.00

Based on our 1-2-3 model of the global footwear market, which incorporates population and climate projections from the Farmer's Almanac and other sources, we are confident that you'll be able to beat that magic number and win yourself a wonderful vacation for you and your spouse at the Ecuador Hilton, free of charge. Of course, as far as transportation to and from Ecuador, you'll have to make your own arrangements.

Cordially,

Bonnie Neilan

InWord gives you instant spreadsheet integration, plu powerful formatting and typestyle controls.

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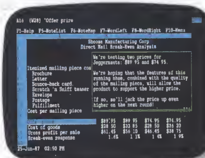

```
A16  [W28] 'Offer prire
F1-Help  F5-NoteList  F6-NoteMap  F7-WordLeft  F8-WordRight  F10-Menu
                              Shoose Manufacturing Corp
                          Direct Mail Break-Even Analysis
                                   We're testing two prices for
                                   Joggernauts: $89 95 and $74 95.
Itemized mailing piece cos
  Brochure                         We're hoping that the features of this
  Letter                           running shoe, combined with the quality
  Bounce-back card                 of the mailing piece, will allow the
  Scratch 'n Sniff teaser          product to support the higher price.
  Envelope
  Postage                          If so, we'll jack the price up even
  Fulfillment                      higher on the next round!
Cost per mailing piece

                                $89.95   $89 95   $74.95   $74.95
Cost of goods                   $28 50   $33 85   $28 50   $36 20
Gross profit per sale           $61.45   $56 10   $46.45   $38 75
Break-even response               1.6%     1 1%     1 4%     1 9%
25-Jun-87  02:50 PM
```

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PC MAGAZINE

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BY DANIEL SELIGMAN

COVER: DAVID LESH

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STAFF LETTER

WANTED: @VIG, @MAIL, @ETC.

This issue marks the debut of Daniel Seligman as *LOTUS* essayist (see "A Day at the Races with *1-2-3*," page 124) and the beginning of what we hope will be a long association. Seligman recently retired as associate managing editor of *Fortune* and continues as contributing editor (he writes the "Keeping Up" column). He is a seasoned *1-2-3* user as well as a specialist in offbeat, short-term investments—the subject of his essay.

Seligman's suggestion for a new *1-2-3* @function called @VIG got us thinking about some home and office computing functions that have not yet been implemented in spreadsheets. A contest ensued, and the winners were @ABOY and @AGIRL, which are designed for the employee who needs constant positive feedback in order to keep working. These functions display a complimentary message every time you recalculate or save a file.

Other good ideas were @FUDGE, which hides money in your budget where it won't be found by Accounting, and @RANDOM, which replaces revenue in each monthly forecast with a pure guess (sometimes this works better, anyway). If you have suggestions along these lines, we'd like to hear from you. By the way, in this issue there's a review of a product that offers 45 new @functions.

We'd also like to hear from you on a number of topics we intend to cover in an upcoming *LOTUS* Town Meeting issue, which will be based primarily on reader mail. Throughout this month's issue, you'll find requests for the information and opinions we want to collect.

JOYCE RAVID

Seligman—in search of @functions

We look forward to your letters.

This issue also inaugurates a redesigned and expanded New Products section. The section will provide a quick yet comprehensive overview of software and hardware that is particularly interesting to *1-2-3* and *Symphony* users, including information that formerly appeared in our Listings section. Each item will summarize the product in a headline of 20 words or less and then provide additional information if you want it. The idea is to let you keep up without investing much time. Let us know how you like it.

Daniel A. McMillan, President
Lotus Publishing

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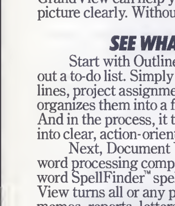

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CIRCLE 106 ON READER SERVICE CARD

LOTUS REMOVES 1-2-3'S COPY PROTECTION

Lotus Development Corp. has announced the Value Pack, a set of enhancements for *1-2-3* Release 2/2.01. A key feature of the Value Pack is a mechanism to remove copy protection from Release 2/2.01. Also included in the Value Pack are *Lotus Speedup, Lotus Learn*, and greater support for the PostScript page-description language and graphics-capable monitors. Purchasers also get six months of premium, toll-free telephone support from Lotus.

Lotus Speedup and *Lotus Learn* are add-ins that were introduced last fall for *1-2-3* Release 2.01. *Speedup* lets you recalculate only cells whose values have changed since the last recalculation. *Learn* provides an automatic keystroke recorder that makes it easier to write and store *1-2-3* macros.

The Value Pack is available to all *1-2-3* Release 2 and 2.01 customers. To order directly from Lotus (for a $15 handling and shipping charge) or for more information, call 800-426-7682. For a limited time, the package will also be available through Lotus-authorized dealers.

MORE DETAILS ON 1-2-3 RELEASE 3

Lotus Development Corp. has released additional information on the upcoming *1-2-3* Release 3.

Spreadsheet *1-2-3* Release 3's spreadsheet has been enhanced to allow three-dimensional worksheets, multiple files in memory, linking of formulas with files on disk as well as in memory, background recalculation, automatic cell formatting, spreadsheet auditing, and range and formula annotation. The working area has been increased to 256 worksheets, each containing 256 columns by 8,192 rows.

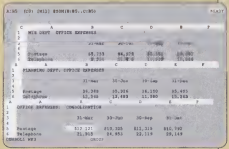
Graphics Some of the major enhancements to *1-2-3* Release 3's graphics module include automatic updating of an on-screen graph when the related worksheet is changed; support for new graph types, such as high-low-close-open graphs, mixed line and bar graphs, area charts, and horizontal graphs; new graph options, such as logarithmic scaling and two Y axes; support for graphics Metafiles; and control over colors, fonts, hatching patterns, and graph size.

Database The new Blueprint interface and drivers provide two-way access to external data sources. You can now query and import data from external databases without having to translate files or leave *1-2-3* Release 3.

Printing With Release 3 you can print graphics directly from the *1-2-3* menu, and you can print text and graphs on the same page. There's built-in print queuing, better font control, and support for devices that use the PostScript page-description language.

Odds and ends *1-2-3* Release 3 is not copy-protected and has network capabilities (including file reservation), an Undo command, a keystroke recorder, and new macro commands.

An article that details most of *1-2-3* Release 3's new features is scheduled for next month's issue of *LOTUS*. Lotus says it will ship *1-2-3* Release 3 in the fourth quarter of this year. The suggested retail price is $495. Upgrades are $200 for Release 1A users and $150 for Release 2/2.01 users



A 3-D worksheet illustrates the consolidation of depreciation expenses from several departments.

LETTERS

INDIRECT ADDRESSING

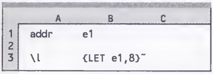
"Back in Space" [March] states that the {LET} command can "derive its target address from the cell named *addr*." But the cell named *addr* simply contains a label representation of another cell location. Can the {LET} command really assign a value to a cell designated by the contents of another cell?

In other words, I'd like to write a macro command that assigns a value to a cell named in another cell.

Frank DeBenedetti III
Salem, Oreg.

Editor's note: *The {LET} command can indeed assign a value to a cell identified in another cell. We discussed this technique in the December issue on page 36, and on page 57 of that issue we presented a macro that exploits the technique to simulate a horse race.*

To make a {LET} command reference a cell indirectly, you must create a dynamic macro statement. A dynamic statement is a string formula whose result is a macro command. For example, in the following figure, cell B3 contains a string formula:



```
        A        B          C
1   addr     e1
2
3   \l       {LET e1,8}~
```

The string formula in cell B3 is +"{LET "&addr&",8}~" (cells B1 and B3 are named addr *and* \l, *respectively). Because the formula appears as a macro command,* Symphony *treats the formula as a macro when you press MACRO-L. When you change the address in cell B1, the macro command in cell B3 changes appropriately.*

ANOTHER ERROR?

In "My Favorite Macros" [March], E. Michael Lunsford is correct in saying, "There are few things more irritating than finding that a print range is too wide for the paper in your printer."

One of the few more irritating things is finding yet another bug in a macro or program copied carefully from instructions in your magazine. When I try to invoke the macro for judging print ranges, the following error message appears at the bottom of the screen almost instantaneously: *Macro: Invalid range in LET (B57).*

Oh well, guess I'll wait (as usual) for a few months until your @ERR correction appears.

Cheryl Lavertu
University of Maine
Orono, Maine

Editor's note: *Sorry, we won't be printing an error correction for that macro. Recheck your worksheet. Did you assign all the labels shown in column A as range names for the adjacent cells of column B? Determine whether the name* jhere *exists in your worksheet by pressing the GOTO key and entering* jhere. *If* 1-2-3 *presents an error message, you've found the source of your problem. Reenter the label* jhere *in cell A67, then use the Range Name Labels Right command to reassign the macro's associated range names.*

A LESSON FROM THE SCHOOL OF HARD KNOCKS

In regard to Robert Hildebrand's "In the School of Hard Knocks" [January], please note that while the @ROUND function used with the @PMT function may reconcile your records to your bank's records, the payment schedule is wrong (notice the overpayment of principal by the end of the loan, in the amount of .13). Thus, we must stick together and change the bank's policy, not our formula, which ends up yielding the correct total principal amount.

A great article anyway.

Paul W. Schafer, President
EMECO Industries
Hanover, Pa.

Author's note: *You can't change the bank's policy: Banks round payments because it's impossible to pay in fractional cents, not just to be malicious. Because of the rounding, there will always be a small error at the end of a loan period (unless the unrounded payment extends only to two decimal places). This error is reconciled with a smaller amount due as the last payment on the loan.*

TWO PLUS TWO DOES NOT EQUAL THREE

Peter Aitken's "Lives of a Spreadsheet Cell" [March] makes several welcome points regarding the importance of the appearance of *1-2-3* worksheets. However, as the author points out, there is a danger in suppressing decimal places in your spreadsheets. Although the reality of a calculation may be 1.7 + 1.7 = 3.4, the appearance of a decimal-suppressed worksheet that reads 2 + 2 = 3 is not one that I'd feel comfortable in presenting to management!

John C. Krajicek, Asst. Tax Director
Commercial Metals Co.
Dallas, Tex.

Letters to the editor should be sent to Letters Editor, LOTUS *Magazine, P.O. Box 9123, Cambridge, MA 02139-9123. Letters may be edited for length and clarity.*

NOTICE: TOWN MEETING

Send us your stories

You're invited to participate in the *LOTUS* Town Meeting issue that will be published later this year. To take part, send us your thoughts on any of the following topics (250 words maximum per topic). Here's what we'd like to know:

1. What's the biggest problem you've solved for your company by using *1-2-3* or *Symphony*? Don't be modest; we want to know.
2. Are you using a spreadsheet for an unusual purpose or in a unique application setting? Tell us about it.
3. Is there a spreadsheet hero in your department or organization (someone whose *1-2-3* or *Symphony* expertise has helped you out of a jam)? Write and tell us about him or her.

The most interesting and unusual responses will appear in the *LOTUS* Town Meeting issue. To share your experiences with the rest of the *LOTUS* community, we need your responses by August 1st, so get cracking! We'll acknowledge all the items we receive, but we cannot return unused material. Send your stories today to:

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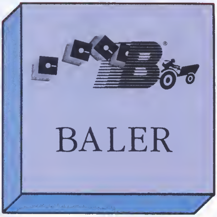

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THE GROWING SOPHISTICATION OF DESKTOP SCANNERS

When you look at a piece of paper, your brain cleverly takes in the whole page. It identifies columns of text (along with different type sizes and italic and boldface characters) and processes the drawings or photographs. Until recently, scanning equipment hasn't been nearly as adroit or discriminating as your nervous system.

Scanners—devices that capture a digital image of a printed page and convert it into machine-readable ASCII characters—have been around for at least 25 years. Like the early computers, the first scanners took up a whole room and could read only type fonts especially designed for optical character recognition (OCR). They also cost hundreds of thousands of dollars.

All that is changing in a hurry. Before long, many people will be using a desktop scanner that can read almost any typeface (in many cases, at a rate of more than 200 characters per second), store the characters in your favorite word processor's file format, and capture high-quality images—all from a single pass of the scanner.

New software lets units recognize almost any picture or typeface.

The scanner marketplace began to change rapidly as desktop publishing caught on. DTPers looked to scanning as the logical way to capture photographs and drawings for their desktop productions. In fact, CAP International (Marshfield, Mass.), an industry-analysis group, estimates that more than half the scanners shipped in 1987 were ticketed for desktop-publishing applications.

Competitive pressures have produced a variety of DTP-oriented systems, which cost from less than $300 (for slow-speed devices that replace the printhead of a dot-matrix printer and scan a page as it rolls through the platen) to $6,000 machines that can capture photographic images with a high de-

CURT BERNER

gree of gray-scale fidelity. Many of the scanners at the high end of this range can read a limited number of commonly used fonts, like the Courier 10.

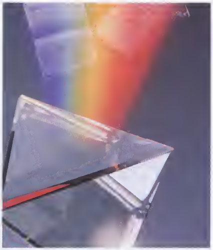
Many industry observers expect scanner prices to drop to half their current levels within the next five years. International Data Corp., a market research firm in Framingham, Mass., predicts that 1987's scanner sales of about 47,700 units will grow nearly 760% by 1991. The real excitement in scanning is being generated not so much by reduced costs, but by new software that wrings much more utility out of the increasingly competent hardware devices.

A good example of this higher-level performance is the Discover 7320 system produced by Kurzweil Computer Products (Cambridge, Mass.), which offers what the manufacturer calls intelligent character recognition. Denise Widman, marketing manager for Kurzweil, explains that the system uses artificial intelligence techniques to read virtually any typeface, in any of seven languages. It is also the first product to contain a coprocessor card that lets you scan in the background while using other applications.

Under ideal circumstances, the $10,000 to $14,000 Discover system can read a page in about 30 seconds but may take as long as two minutes if characters are broken or blurred, since the system must compare each character's properties against a built-in lexicon. Once it "learns" a new character form, the system will read similar documents faster. This is an increasingly important feature, says Widman, "because of the proliferation of laser printing and different type styles."

Another scanning system capable of reading almost any typeface is the Compound Document Processor, developed by Palantir Corp. (Santa Clara, Calif.). Palantir's high-end Model 9000 is a stand-alone unit that contains an awesome array of five Motorola 68020 microprocessors, each one equivalent to the Macintosh II's processor. Added to this is up to 4 megabytes of RAM.

All this computer horsepower makes the Palantir scanners expensive (complete systems range from about $20,000 to $40,000) but also unusually fast for a system in this price range: The top scanning rate is about 270 characters per second—four to seven times faster than the low-end Kurzweil systems.



Much of the software improvement so far has come in the area of complicated algorithms and methods for dealing with a wide range of character and text formats or refining captured images. Tony Bové, coeditor of *Desktop Publishing: The Bové & Rhodes Inside Report*, believes that more work should be done on the front end of the process: "separating the document into text, line art, and halftones (photographic images), with OCR occurring in the same pass as the separation process."

One company, iBase Systems Corp. (San Francisco), has spent the last two years building what it calls *PageImage Processing* software, which can work with most scanners on the market. Mike Gee, president of iBase, agrees with Bove about the need for better front-end processing and adds, "Our product uses the [scanner's] ability to identify characters that it is uncertain about to allow the operator to check the questionable characters against the original bit-mapped image. The software also converts text and images into a wide variety of file formats for immediate use by applications software."

The next step, according to CAP International's Don Ryan, may be a move away from the current crop of largely single-application scanners toward multiple-use machines, which Ryan believes will begin with "software that lets you use the same machine as an input device for fax [facsimile], desktop-publishing, and even image-database applications, similar to the text databases we have today." Ryan believes this multiple-application capability will appear initially for single-user devices, becoming available for networked scanning systems by the end of the decade.

U.S. SCANNER SALES

Year	Units
1986	10,000
1987	47,700
1988	130,000
1989	230,000
1990	320,000
1991	410,000

Source: International Data Corp.

With all this scanning capability on the way, how will people apply this new resource to the office routine? Kurzweil's Widman suggests that companies will be storing and retrieving market reports, proposals, contracts, technical publications, customer correspondence, and even the resumés they receive. "I expect scanners to become an integral part of office systems—like faxes and PCs," she says.

In addition to desktop publishers, the legal community—which is usually drowning in documents—has rapidly adopted scanning, as have firms involved in creating electronic and CD-ROM databases. Not only does scanning permit electronic storage of documents that would otherwise be consigned to file cabinets, microfilm, or other less-accessible media, it can save money. According to iBase's Gee, customers who have selected appropriate applications for the company's current high-end scanning equipment have shown that, depending on the type of input, the devices can do the work of as many as 10 data-entry clerks pounding away at their keyboards.

For the future, most observers of the scanner market see steadily declining prices, following much the same curve as PCs and personal copiers. In fact, because there's so much similarity between the internal components and control mechanisms for scanners, copiers, and laser printers, systems that combine all these capabilities in one package have already started to appear.

Currently, these integrated systems cost $15,000 to $20,000, but prices are expected to come down dramatically over the next three to five years. Also in the wings are color scanners, but their prices—starting at about $9,000—place them beyond many people's budgets for now. *—Richard Dalton*

24-PIN PRINTERS' POPULARITY GROWS

No more tattoolike letters

Suddenly, there's a run on 24-pin dot-matrix printers. Last year, sales of 24-pin printers doubled. This year their market share could reach 35%, and according to optimistic calculations, by 1991, 24-pin printers could outsell their 9-pin cousins by a 2-to-1 margin.

The range of 24-pin printer models has greatly expanded. Speed, print quality, and paper handling have all improved, and the machines work with more software, offer more fonts, and sport flashy, easier-to-use front-panel controls. Even the noise level has diminished. With their better graphics resolution and optional color, 24-pin printers already appeal to a broad spectrum of the buying public, and manufacturers plan even further refinements.

Yet with all the good press 24-pin printers are receiving, there are strong rumors that printers with even more pins may reach retail shelves. By 1989 we should see the first 32-pin dot-matrix printer, and Epson Europe has already shown a working 48-pin model in Europe.

"A couple of years ago, only two or three manufacturers offered 24-pin printers," recalls John McIntyre, product-line manager for serial and line printers at NEC Information Systems (Boxboro, Mass.). "Today, every major manufacturer of dot-matrix printers, including IBM, is offering at least one." In fact, you can choose from some 20 or more models of 24-pin printers varying in draft speed from 180 cps (characters per second) to 400 cps, priced from $499 to close to $2,000. All this competition means more features and better performance at every price point.

When Toshiba introduced the first 24-pin printer (the P1350) to the American market in August 1982, it cost $2,199 (which shortly went up $100) and operated at 160 cps in draft mode. Today the top of Toshiba's line, the P351SX, costs $1,599, operates at 360 cps, and has a lot of extra functions. The highest-priced 24-pin printer now available, the RuggedWriter 480 from Hewlett-Packard, was introduced last year. It costs $1,695 and operates at 480 cps in draft mode. The RuggedWriter and the less expensive Accel-1500 (from Advanced Matrix Technology, Newbury Park, Calif.), which runs at 400 cps in draft mode, represent a new high end to the market.

Last year also saw the 24-pin market expand at the low end, as two printers—the Epson LQ500 and the NEC P2200—broke the $500 barrier, although the Epson has since risen to $529. McIntyre says he expects to see several manufacturers introduce competing low-end machines this year. He adds, "I wouldn't be surprised if the $300 barrier is breached in 1989. That's a very popular price point, which will lead to a huge volume of sales because 9-pin printers will have lost their last advantage." McIntyre believes that in the mind of the buying public, the 9-pin printer is already obsolete; he also thinks the market share for 24-pin printers will reach 70% by 1991.

The chief allure of 24-pin printers has always been their superior print quality. More and smaller dots—8 or 10 thousandths of an inch in diameter as compared with 14 or 15 thousandths of an inch for 9-pin dots—makes it possible to produce thinner lines and smoother curves. The resulting characters look like they came from a typewriter rather than a tattoo gun. Another reason for the improved print quality lies in the dot matrix itself—the pattern used to print a character. The Toshiba printers, for example, offer a 24-by-42-dot matrix, which allows for a very well formed character. "Other companies are starting to increase their matrices from 24 by 29 and 29 by 32 to higher levels like ours," says Daniela Salvadori, senior product manager for dot-matrix printers at Toshiba.

Salvadori also mentions new multistrike ribbons and better inks as contributing factors to sharper, blacker lettering. The availability of a wider selection of fonts has also helped print quality. "At first, 24-pin printers had only two fonts: draft and letter quality," recounts Salvadori. "Now our high-end machine has four resident fonts, plus condensed and proportional. And you can download up to nine fonts on a page." The move to more fonts is happening across the spectrum of 24-pin printers, and push-button controls on the printers' front panel makes mixing font styles in a document even easier.

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Print quality isn't only a text concern; graphics capabilities have also been improved in 24-pin printers. To make the graphics quality better, manufacturers have made it possible, through multiple passes of the printhead, to produce 360 by 360 dots per inch (dpi) in graphics mode, up from an original graphics resolution of 180 by 180 dpi. Laser printers generally print at 300 by 300 dpi. Although the laser printer's resolution is lower than achievable in 24-pin printers, the quality is still better because of the way the toner is applied to the page. Laser printers are also faster—multiple passes of the dot matrix's printhead slows the job down proportionally.

As part of the push to make 24-pin printers more graphically inclined, the memory capacity has been continually upped. Originally, 2K buffers were standard. Now manufacturers are putting in 8K, 12K, and even 32K buffers. Toshiba's P351SX has a 32K buffer and can take a memory card with an additional 32K.

Paper handling is also becoming a 24-pin-printer asset. "For heavy-duty word-processing applications, full paper-handling capabilities are crucial," says Alex Schibanoff, director of marketing for the Information Systems Division of Brother International Corp. "These capabilities have improved dramatically over the years. For example, in our model M-1724L, the tractor feeder is built in, and a sheet feeder is optional. Next year we'll offer a model with dual sheet and envelope feeder."

Many 24-pin printers now let you print on single sheets without first removing the continuous-form paper. You can also tear off a sheet from the continuous form immediately after it prints, without wasting a sheet, which is vital for applications that involve sequentially numbered forms.

The list of improvements to 24-pin printers goes on. For one thing, software producers now routinely add a variety of 24-pin printer drivers to their packages, so users don't have to wonder which driver to use. Some specialty software is also available. For example, *Matrix Plotter*, a $99 package from Insight Development Corp. (Moraga, Calif.), gives 24-pin printers the ability to print complex graphical drawings that up to now only a plotter could produce.

And many 24-pin printers have reduced their noise levels. The current standard is 55 decibels, a 3-decibel drop that could translate into a 100% improvement.

Every aspect of 24-pin printing will continue to improve over the next couple of years: speed, price, print quality, paper handling, durability, fonts, ribbons, noise control, software support, front-panel controls, all of it. One of the most significant next developments in 24-pin printers will be the inclusion of color.

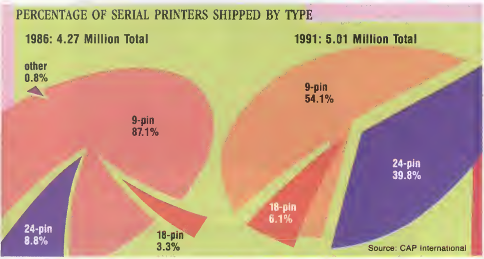
Color printing is almost universally accepted as desirable, yet users have been slow to embrace it. Some industry people point the finger at the vacuum in reasonably priced color photocopying machines. Some say it's just market inertia. Whatever the reasons, McIntyre says the time for color is coming. "While color impact printers constitute less than 10% of the market, the market is increasing tremendously. In a year, most 24-pin printers will have color as a standard feature or as a low-cost option, except for the low-end machine—at least that's our position [at NEC]."

Color printing may play another role in the high-end dot-matrix market. It may be the catalyst for the delivery of printers with more pins. For years rumors have spread about 32-pin or even 36-pin printers. But now, although no manufacturer is willing to say it is close, some industry people claim 32-pin printers will be on the market by early next year.

"The next natural evolutionary step for dot-matrix printers is 32 pins," says John Dunkle, director of information systems for the Yankee Group (Boston, Mass.). "Such printers would bump up the resolution to 300 dpi with two passes of the printhead—the resolution of current laser printers. Combine this with the ability to print in color, and you might have a formidable competitor for lasers in the desktop market. Plus, impact printers would have the versatility that lasers lack—they can handle continuous sheets, 17-inch-wide paper, and multipart forms." According to Dunkle, the initial price point will be around $1,500 or less, with a $200 to $300 premium for color.

Many people in the industry are skeptical about the market strength of printers with more than 24 pins. The main question is, Will the improvement in print quality be substantial enough to justify the higher price? There are other problems as well: It can take years before software manufacturers support a new printer type. Durability may also be tricky to achieve. "The material used in the pins has to be even stronger than it is today because the pins will be thinner," says Maureen McManus, associate director of CAP International (Norwell, Mass.), a market research and consulting firm. "The pin size can also lead to puncture and fraying problems with ribbons."

In spite of the problems, the inexorable march of technology will certainly lead to dot-matrix printers with more pins. At the Hannover Fair in West Germany this March, Epson showed a 48-pin beast that leaps over the next two gen-



Source: CAP International

PAMELA PRICHETT

erations of dot-matrix printing. It can print graphics at 360 dpi in one pass.

The 48-pin Epson has been announced in Japan and reportedly will be available in Europe by the fall, at a price of 5,500 Deutschmarks ($3,377 at the current exchange rate). This is a hefty price for a machine that operates at 250 cps in draft mode and by all accounts doesn't dramatically improve print quality. But it might be useful in many industrial applications, suggests McManus, where it is important to produce good-quality bar codes.

McManus sees more potential in new techniques for improving the printing ability of 24-pin printers. She points to the work being done at SDI (Wilton, N.H.), a company that develops and licenses printhead technology. SDI has patented a printhead technique called intradot. It causes the printhead to move vertically as the carriage pulls it horizontally across the page. As Royden Sanders, the chief software engineer, explains, "This lets the printer lay down its dots in a sine curve, which fills in the vertical spaces. It can select up to 13 times more vertical firing positions per character. While the spacing is variable, the overall resolution is equivalent to about 500 dpi." In addition to bettering the print quality, the intradot technique can double the draft speed and nearly double the letter-quality speed.

Intradot was invented about two years ago and has been improved since. One manufacturer, DataSouth Computer Corp. (Charlotte, N.C.), has already taken an option to license the technology but, according to Sanders, hasn't yet licensed it. Discussions with other companies are progressing. Given the time it takes to prepare a printer for the market, intradot printers are still at least a year and a half away.

Just a few years ago 24-pin printers ran at only 160 cps in draft mode and roughly 50 cps in letter-quality mode. They were noisy, forced you to crawl around behind them to set DIP switches, used only two fonts, and wasted paper. Today these machines are fast, sophisticated, and a growing market success. However, in the next several years, if 32-pin, 36-pin, and eventually 48-pin dot-matrix printers develop in the same way, 24-pin printers may come to seem as prehistoric as the 9-pin printer does today.

—Henry Fersko-Weiss

COMPUTER VIRUSES REFUSE TO GO AWAY

But not as prevalent as reported

Computer viruses are real. But to paraphrase Mark Twain, reports of their existence may be greatly exaggerated.

Stories about them have circulated since at least the 1970s. Back then they were known as worms, programs that insinuated themselves into the operating system of a mainframe or minicomputer, hiding in memory and waiting until a predetermined time to strike.

They often struck in the form of a "gotcha"—a humorous and relatively harmless message that suddenly appears on the screen in the middle of a program and forces the user to press a key to regain control of the system. Worms were sometimes thought to have been inserted by disgruntled data-processing employees, or by custom-software designers as a way of ensuring that they would be paid or later called in to fix the bug.

Now the stories have reappeared. This time the worms are called viruses and they infest software, networks, online information services, and microcomputers. Some viruses replicate, according to the stories, by copying themselves into DOS's COMMAND .COM or .SYS files. Then, after a certain number of replications, the virus can delete all the files on the disk or scramble the file-allocation tables.

Viruses have reportedly infected networks at both IBM and the Internal Revenue Service, although both organizations deny it. No major companies have stepped forward to admit their networks have been infected.

Actual viruses have been found, however, on college campuses both in the United States and in the Middle East. "It's a major problem," says David Lutz, software specialist at the University of Toledo, which has been infected by a virus called Brain, allegedly developed in Pakistan by a hacker playing a practical joke on a friend.

Brain, according to Professor of Marketing Alan Flaschner, who first discovered the infection, spreads when a PC that has been started up by an infected disk reads the directory of an uninfect-

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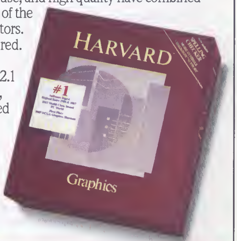

ed disk. At that time, the virus copies itself into the COMMAND.COM file of the healthy disk. When a disk becomes infected, the Brain virus goes into attack mode and destroys tracks on the disk.

Flaschner uses microcomputer models to teach his students marketing strategy. The PC is supposed to be only a weapon in the marketer's arsenal, he says, but because of the virus, "I'm spending more time teaching students about micros and the pitfalls of using them, which is taking time away from my basic course."

The university has several computer centers where the infection has been reappearing since February, according to Lutz. He says that write-protect tabs are put on the computer center's disks, the disks are regularly swept, and any infected disks are eradicated. But since students frequently come in with their own data disks, within two weeks about half the university's computers are reinfected. Lutz says his only protection against the virus right now is to educate students in ways to recognize it on their own disks.

The University of Pittsburgh has had a similar problem with a virus, according to Shawn Hernan, a faculty computer consultant at the university. The university is trying to eliminate this virus, which erases the boot tracks of a disk, from its software library, Hernan says, but the virus remains in the user community.

He agrees with Lutz that the best defense against the virus is educating the user community about the dangers of spreading the virus and what precautions they can take.

Thus far, viruses have mostly appeared at universities, and those corporations surveyed for this article say they are concerned but have not instituted new policies to protect against possible viruses.

"We haven't done much," says one computer analyst at Allied Van Lines, who asked that her name not be used. "I think viruses are more of a problem if you share software or get software from bulletin boards," both of which are discouraged by the company, she adds.

Ray Deaton, director of MIS at Cox Cable Communications in Atlanta, is even more doubtful. "I've been in this business for 17 years and I've never seen a virus." He adds that all of the company's software is either purchased or custom-developed, and users do not bring in their own packages.

While virus reports are widely circulated among computer users—one person has reported more than 30 viruses and Trojan-horse programs—their sources are notoriously difficult to pin down. Such reports often come from "a friend of a friend."

Such third-party reports are a new form of urban legend, according to Linda Degh, professor of folklore at Indiana University. Urban legends are often related as true stories, and they reflect current societal concerns. The difficulty in finding original sources for these rumors, as well as the use of the "virus" nomenclature in this era of AIDS, makes these rumors excellent candidates for urban legends, Degh says. The fact that some viruses do exist gives teeth to the legend, she adds.

Another nonbeliever in computer viruses is Bob Ostrander, president of Public Brand Software (Indianapolis). Public Brand Software is the second-largest distributor of public domain software, the most common way in which viruses are said to spread.

"It's hoopla," Ostrander says. "I have looked at possibly more software than anyone else in the country over the past few years," he says, "and I have yet to see anything." By his own count, Ostrander reviews about 2,000 programs each year, many downloaded from bulletin boards or sent to him by the authors.

Some rumors cite examples of legitimate shareware programs, such as *PC-Write*, that have been modified to con-

ALDUS'S MAC GRAPHICS PROGRAM BRIEFLY INFECTED

It didn't take long for one virus to invade a commercial software package. The victim was *FreeHand*, an Apple Macintosh desktop-publishing program.

That the intrusion was apparently unintentional and that the virus itself was determined to be benign were of little consolation to *FreeHand* publisher Aldus Corp. (Seattle), which had to rework some one and a half days' worth of production after the virus attack was discovered in mid March.

Equally unsettling was how innocently the virus allegedly spread: It infected the software through the computer of an Aldus programming subcontractor named MacroMind Inc. (Chicago).

According to MacroMind President Marc Canter, the virus was a "peace message" from Montreal's *MacMag* magazine, designed to celebrate the first anniversary of the Macintosh II via a surprise March 2 pop-up message on users' screens. Canter says the virus appears to have been unintentionally included on the disk of a game program he received.

Unaware of the digital infection, Canter ran the game program once, then later used the same computer to work on a program for teaching Mac owners how to use *FreeHand*. That disk, which became infected, eventually was sent to Aldus, where it was inadvertently copied onto disks prepared for customers.

Aldus spokeswoman Laury Bryant says that *MacMag*'s virus should "be condemned by every member of the Macintosh community." Earlier this year, the virus file found its way to international information services like CompuServe and Genie. Ultimately, the message appeared on the screens of an estimated 350,000 Mac owners in Europe and North America.

—Charles Bowen

PAMELA PRICHETT

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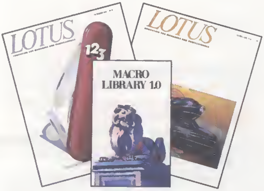

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tain a virus and then uploaded to bulletin boards, where the virus is picked up by unsuspecting users. Although Ostrander has searched for the *PC-Write* virus, he has yet to find it.

Jim Button, one of the leading shareware developers, has also searched for the *PC-Write* virus. "It never happened," Button says. "Someone just posted a message that said it had happened."

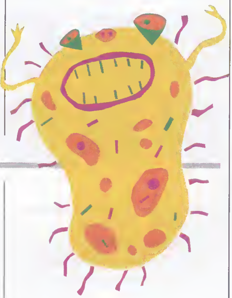
As the rumor began circulating in January 1987, *PC-Write* author Bob Wallace says he began his search for the infected version of *PC-Write*. He, too, was unable to track it down, despite the fact that he offered a $5,000 reward to anyone who could give him a copy of the altered program.

While the extent of the danger created by computer viruses is questionable, that has not prevented some vendors from using the perception of danger to sell so-called virus-protection devices.

Dennis Director, president of Director Technologies (Evanston, Ill.), says that viruses have "caused serious problems" at at least six universities. He admits that viruses are "not what you would call an epidemic," but suggests that companies and universities take steps to protect themselves. Director's solution is an add-on card that write-protects a hard disk just as floppy disks can be write-protected.

Other virus-prevention measures are memory-resident programs that check for a write instruction to any COM or SYS file whenever a disk is accessed. Some of these programs will halt the procedure, tell the user that a write process has been requested by the application, and allow the user to terminate the process.

But whether such products are necessary, as Director suggests, or are simply a way "to make money on this paranoia," as Ostrander claims, remains to be seen. —*Avery Jenkins*



PROTECTING AGAINST COMPUTER VIRUSES

Know your enemy.

In most cases, your best weapons against computer viruses are common sense and a basic knowledge of a few DOS commands. If you're unfamiliar with DOS commands, see the "Journey Through DOS" series that appeared in the October, November, and December issues of *LOTUS*. The following tips and procedures should help you prevent viruses or, failing that, detect and eliminate them.

- Understand the meaning and operation of virus and Trojan horse programs. The seeding of a virus from one system to another is a separate event from the operation of any destructive code the virus may implant. For example, Trojan horse programs execute with the first access; viruses wait for a signal to execute: a specific date or the *n*th access of a target file.
- Use software from reliable sources. If you use public domain, shareware, or freeware programs, contact the writer or distributor and compare the file date and file size before using. If the software does not include a contact address or phone number, DO NOT use it.
- When you download data from another computer, always download to a floppy disk instead of to a hard disk. Then, before copying data from the floppy disk to the hard disk, use the DOS CHKDSK command to check for hidden files. To do this, enter *chkdsk a:*, where *a* is the drive that contains the floppy disk. If the disk has a label, you can expect one hidden file, but if the disk contains any other hidden files, DO NOT copy the data. Determine if the disk has a label by using the DIR command to ask for a directory of the disk: Enter *dir a:* at the DOS prompt. If

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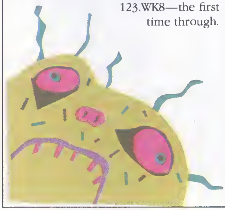
the disk has no label, DOS will report *Volume in drive A has no label.*

- Periodically, use the CHKDSK command to check your DOS directory. In particular, watch for a change in the number of hidden files. An original DOS disk will contain two hidden files (IBMBIO.COM and IBMDOS.COM) or three if the disk has a label.
- To help detect a virus in your files, maintain an up-to-date hard copy of your directories and their contents. Use the DOS TREE command to print the directory structure. Likewise, use the DOS DIR command to print complete information about each subdirectory's contents. Watch for any inexplicable changes in file size and for the appearance of new files.
- Use the DOS SORT command or a DOS utility such as *Directory Assistance* (Individual Software, Belmont, Calif.) or *Hot* (Executive Systems, Sherman Oaks, Calif.) to sort each of your subdirectories by date and time. Any date before 01/01/80 should be suspected. Dates in the future should be carefully checked, as should any date that contains 00 or any time later than 23:59:59.
- Sort each subdirectory by file size. Be alert for unusually large files or files with a size of 0 bytes. Compare file sizes with your hard copy: Any inexplicable size change in COM, EXE, BAT, or SYS files should raise a warning flag.
- Sort each subdirectory by file name. If one of your files is called 123.EXE, for example, and you find a file with the same name but the file extension .COM, this could spell serious trouble. A COM file executes first in the DOS hierarchy. Also, look for file names that seem odd according to your naming conventions.
- Sort each subdirectory by file extension. You may not have picked up suspicious-looking files or extensions—such as DBASE.EVL or 123.WK8—the first time through.



- When recycling a floppy disk, always use the DOS FORMAT command to reformat the disk; DO NOT simply erase all the files from the disk.
- If you're serious about virus prevention, prepare a "clean boot" disk. To do so, turn off your PC, insert an original DOS disk in drive A, and turn the PC back on. Enter *diskcopy a: a:* at the DOS prompt and follow any further screen prompts. Henceforth, use this duplicate to start up your system.
- Prepare another clean disk containing at least your DOS files. Include any other files a virus writer might expect to be on a disk—CONFIG.SYS, AUTOEXEC.BAT, and 123.EXE are good candidates. Write-protect this disk. Then if you need one, you'll have a reliable backup of these files.
- If you find any suspicious files, remove them with one of the previously mentioned utilities. The idea is to eradicate them completely. Do not use the DOS DEL command, which merely replaces the first letter of the file name so that it won't show up when you execute a DIR command. Any file deleted with the DEL command continues to exist until it is overwritten. Likewise, do not use the DOS ERASE command.

—Pamela Kane

WRITERS PREFER COSTLIER WORD-PROCESSING PROGRAMS

But most people use only 20% of the features.

The developers of the best-selling word-processing packages are engaged in a "feature war," and the arsenal consists of new program attributes. Packages such as *WordPerfect, Microsoft Word*, and *WordStar 2000* contain literally hundreds of features.

Most people, however, use only a small fraction of the features in a high-end product. "Almost no one uses more than about 20% of the software's capabilities," says Leon Williams, president of MicroPro International (San Rafael, Calif.).

In an attempt to slow the tide of feature expansion, Williams says MicroPro is introducing application-specific editions, starting with a legal package that is an alternative edition of *WordStar 2000*. "Vertical-market editions do not burden users with features they don't need," Williams says.

Joe Seidler, vice president and senior analyst at Infonetics, a market research firm in Santa Clara, Calif., thinks this should be a trend: "Users want to see word processors with a standard set of features and optional add-ons." Most analysts, however, think users want a broad range of features, regardless of whether they are included or optional.

David Thomas, an analyst with Hambrecht & Quist (New York), agrees. He says that even if people don't use all of a product's features, they feel more comfortable having them.

On the other hand, Dave Perro, a research analyst with Dataquest (San Jose, Calif.), expects low-end word-processing programs to be around for a while. Not everyone wants to pay top dollar for word processing, Perro says. "It's nice to have the desktop-publishing-type functionality, but for most home users, the basic cut-and-paste feature is probably fine."

However, the consensus among analysts is that the market is moving toward high-end products. Pete Peterson, executive vice president of WordPerfect Corp. (Orem, Utah), says his company sells a full range of word-processing programs, including *Personal WordPerfect* and *WordPerfect Junior*. Peterson says customers are choosing the high-end *WordPerfect* product in overwhelming numbers. "We have sales of about $10,000 a month for *Personal WordPerfect*, $6,000 a month for *WordPerfect Junior*, and $9 million a month for *WordPerfect*." he says.

Peterson adds that the street prices of top-of-the-line products like *WordPerfect* end up in the $200 range anyway, so there really isn't as much of a price difference as it would seem.

Of course, if the trend continues, this year's feature-packed program may seem wimpy compared with the programs to come. "In two years the mid-range products will be what the high end is today," MicroPro's Williams says.

Whatever the high-end products turn out to be, people—particularly people who write for a living—will buy them. The main reason for this may be the way people feel about writing. "If you write, you write seriously," Peterson says. "I haven't met a writer yet who isn't serious about it." *—Jon Pepper*

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WILL PS/2 CLONES BE BETTER THAN THE IBM ORIGINALS?

Chips and Technologies President Gordon Campbell thinks so.

By this past spring, there were so many gauntlets being flung at IBM that Silicon Valley was beginning to look like Michael Jackson's accessories drawer. The question was this: Would IBM sue anyone who brought out a machine compatible with the PS/2's exotic Micro Channel architecture? Or would IBM do what it did with the IBM PC clone makers, and for the time being at least, let them all flourish in the hope of establishing an industry standard?

At the center of all the speculation was a San Jose, Calif., design and marketing firm called Chips and Technologies, which was recently ranked as the most profitable smaller company in Silicon Valley (and whose chips are already in half the AT clones on the market).

On March 9 the company demonstrated the first working model of a system fully compatible with the PS/2 Models 50 and 60, IBM's middle-level, '286-based machines. At its heart was the Chips/250 chip set, which packed all the system-logic functions (and a number of features not found on the IBM) onto only seven chips. The company's other innovations include a Super VGA (video graphics array) chip capable of 640-by-480-pixel displays in 256 (count 'em) colors.

Within a few weeks of the demonstration, Dell and Tandy introduced clones using Chips and Technologies chip sets—and more clones were on the way. By then, IBM had announced that it would continue to license its personal-computer patents—including new patents that might be granted for the PS/2, at up to five times the rate for its PC XT and PC AT technology. Suddenly there was a whole new game on the field.

LOTUS magazine asked Chips and Technologies President Gordon Campbell how he sees it unfolding. The interview was conducted in March by Lindsy Van Gelder.

LOTUS: What's your reaction to IBM's announcement that it will license some of its PS/2 technology?

GC: It's very positive, in the sense that it takes a lot of the speculation out. Before the announcement, there was a fair amount of sentiment on the part of some companies that it wasn't wise to buy compatibles until the legal side was cleared up. Now we can get on with business, which is a very healthy thing in the industry.

LOTUS: How does the announcement affect your company personally? Are you applying for a license?

GC: The licensing issue has been primarily at the systems level. At the chip level, it isn't clear whether the license is necessary or not. Part of the issue is that it's very difficult to say that the only use for this chip is a Micro Channel application, even if it's a semiconductor specifically intended for that. We've tried to take a very simple and straightforward decision in our discussions with IBM; if it was determined that we'd need a license, then we'd be more than happy to sign up for it. We certainly didn't want to have an argument with IBM. I think we're getting close to working something out with them, but we haven't resolved it yet.

LOTUS: Aside from the legal issues, what are the problems involved in cloning a PS/2 as opposed to the older-generation PCs?

GC: I think it's a much more difficult machine to come up with a compatible system for, technically. Part of the evidence of that is that when the original AT came out, you could go out and buy a compatible within three to six months. Here it's taken a year for us to show just compatible working silicon, and it'll be maybe a year and a half before there's significant competition in the marketplace.

LOTUS: Do you think there would have been more of a push to make these technical leaps if there had been a greater embrace of the PS/2 in the marketplace?

GC: Not at all. Chips and Technologies started working the day IBM announced the PS/2 family. I don't think we could have provided more resources or attention to the development of PS/2 compatibles than we have.

LOTUS: What share of the market do you think will go to the compatibles? Do you think it will follow the same scenario as the PC?

GC: We may go through some dynamics before that market really settles down. My guess is that most of the people who've bought PS/2s so far are IBM-loyal corporate customers. There needs to be a reason for the rest of the market to embrace PS/2. I think what will make that happen is another software phe-

ED KASHI

nomenon—like *1-2-3*—that needs OS/2 and PS/2 hardware.

LOTUS: Would you care to guess what that software might be? Desktop publishing?

GC: If we could identify that blockbuster program, we'd all run out and buy stock in it! But I think IBM's push toward more '386-based machines implies multitasking, whatever the software is.

LOTUS: Okay, let's pretend that I'm a major corporation. Why do I need a PS/2 when I can go out and buy the old '386-based machine?

GC: Let me start from a different perspective and describe why the *industry* needs it. When IBM defined the original PC, it was a haphazard case of this-looks-like-an-interesting-opportunity. It wasn't until it grew into a huge business that IBM looked again and said, "Hey, these are real computers and they need to be part of our whole computer product line." That was when the PS/2 came out.

Meanwhile, the original AT had come out at 6 MHz and then IBM upgraded it to 8 MHz and ultimately to 10 MHz. Then the industry tried to push it up to 12 MHz and faster. But they couldn't do it because the AT bus is a very poorly defined bus structure; when you ran it at 12 MHz or higher, all of a sudden the add-in cards ceased to communicate reliably with the PC. The industry had to jump through hoops to come up with new architecture that could support higher performance but still use that old bus—which we did on the '386 and the second-generation '286 AT. We had to take the old synchronous architecture that IBM defined and split it into three modules—one for the bus, one for the CPU, and one for memory—and allow them all to run on different clock speeds, yet pass data back and forth. These are the kinds of things we had to do to live with IBM's definition of the old bus.

But now look at this new Dell machine [the 20-MHz, 80286-based System 400]. That's going to be the most cost-effective high-performance machine on the market—it's going to be $1,000 cheaper than the '386 AT, and yet it's going to run at 20 MHz!

LOTUS: And so with the Micro Channel bus, you're not always playing catch-up ball to bad design?

GC: When IBM defined the new Micro Channel bus, it did a much better job. It's a little like Alice in Wonderland, when she drank out of the bottle and grew tall. When you push performance in the old bus, you hit your head on the ceiling. In the new architecure, it's more comfortable.

But it goes further than that. Now if you've got a malfunctioning card, it hangs the whole system. In PS/2, we've got a bus definition that recognizes a malfunctioning card and shuts it off. We've also got, ultimately, the ability to handle multiple processors, which is important because we're not going to be able to increase clock speed much more; we probably won't be able to squeeze out more than 10 more megahertz. If we hit the wall at 30 MHz, people still want more processing power—it's like horsepower in cars—and the way we'll be able to do it in the Micro Channel is with multiple processors.

LOTUS: Okay, assume you've talked me into the PS/2. Why do I want to buy yours instead of theirs?

GC: It's cheaper. And you'll have a faster machine—twice as fast as IBM's Models 50 and 60. The third reason is that we tried to look at everything IBM didn't do or didn't do well and turn it to our advantage by doing it better. For instance, in the top-of-the-line Model 80, IBM came up with what it calls the matched memory protocol; IBM didn't want to have a standard cycle to retrieve memory—it wanted to be able to shorten the standard memory cycle for use with faster memory, which would increase system performance. We do that in our Model 50 and 60 clones. In the graphics area, we made a direct tie-in between the CPU and the graphics processor so that you get faster graphics performance. We cranked up the clock speed of the graphics processor so that you can play with 256 colors instead of 16. It goes on and on like that.

LOTUS: But without the software?

GC: The transition from the old architecture to the new is going to take us a couple of years. But we'll get there, and it'll be pretty neat. Have you ever seen a 256-color VGA display? It's absolutely beautiful! When we get those out there, supported by the right drivers, it will be a standard you can live with for a long time. ■

EXCERPT FROM PC WEEK REVIEW MARCH 8, 1988. USED WITH PERMISSION.

Database Add-In for 1-2-3 Has More Capabilities Than Rivals

by Marvin Bryan

The king of the crowded forest of Lotus 1-2-3 database add-ins is unquestionably @BASE...

@BASE was developed by Personics Corp. of Concord, Mass., makers of the popular SeeMORE utilities that add additional columns to the screen displays of Lotus 1-2-3 and Symphony.

With @BASE, it's possible to build colossal 32 M-byte databases in the standard dBASE III Plus format without ever using dBASE itself. Users can convert a normal 1-2-3 database instantly into a dBASE-compatible file, as well as set up dynamic links that will import updated information from dBASE records every time a worksheet is recalculated.

A database can be sorted alphabetically, numerically or chronologically on as many as 128 levels. In fact, @BASE will pack and sort records as much as three times faster than dBASE...

Data can be analyzed with a cross-tabulation module to provide lightning-fast reports in response to such questions as. "What sales people in each division earned more than $20,000 in commissions this month?"

In addition, records can be entered or examined in a form view, where each record occupies an individual screen. Alternatively, of course, the user can choose the usual one-record-to-a-line format.

We tested the current $195 release of @BASE along with a beta copy of the Option Pac, which will retail for $89 95. **Together, these two relatively inexpensive products provide truly remarkable functionality.**

In addition to the indexing feature, the Option Pac will join files to make relational databases, create computed or derived fields, sort a database without rearranging the records on disk, and automatically keep files in the correct sorting order during record entry or updating.

As a bonus, dBASE data can be turned into 1-2-3 graphs with practically no effort at all...

Personics has developed a series of @DB functions to perform calculations and evaluate records within @BASE . Each of these functions use one or more arguments to identify the database, record or field to be acted upon. Some functions allow criteria to be established, such as selecting a subset of records.

The 200-page manual for @BASE is excellent ..The program adds less than 80K bytes to the RAM overhead of 1-2-3. **For those who use both dBASE and Lotus 1-2-3, @BASE is practically a requirement.** ■

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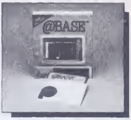

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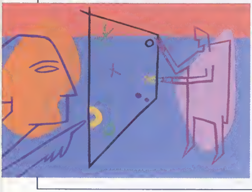
SPECIAL BULLETIN BOARDS

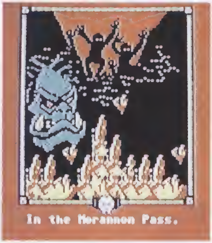
Special-interest computer bulletin boards are always popping up and disappearing. Three of the newer ones that promise to have broad appeal and staying power include a genealogy forum on CompuServe, a 9,000-entry database on alcoholism maintained by the Dartmouth Medical School, and WGBH Online, which offers program listings and transcripts of programs aired by the Boston public radio and TV station.

You can access the Genealogy Forum on CompuServe by entering *go roots* at any prompt. The Forum lets people share ideas and research and provides educational assistance and reference services through on-line conferencing and data libraries.

BRS Information Technologies, a New York database vendor, has added Cork Online to its catalog. Cork Online, maintained by Dartmouth Medical School's Project Cork Institute, is an interdisciplinary bibliographic database of selected information on alcohol and alcoholism. Subscription fees for this service vary.

WGBH Online offers two levels of service: Program listings, announcements, and WGBH's monthly newsletters for educational and community groups are free; the paid subscription service gives you WGBH program transcripts, teacher guides for its *Nova* and *Degrassi Junior High* series, and information about health and fitness based on its *Bodywatch* series. To access WGBH Online, dial 617-576-0862 and enter *wgbh*. —*Rich Friedman*





In the Morannon Pass.

TOLKIEN LIVES

Anyone who has read and loved J. R. R. Tolkien's *The Lord of the Rings* may want to return to that magical world with *The Shadows of Mordor*, a text adventure game published by Addison-Wesley (Reading, Mass.). This third of a series is adapted from Book IV of *The Two Towers*.

In this part of the journey, players must tame the stealthy Smeagol, outwit the Black Riders, and defeat the monstrous spider Shelob. The hardy Hobbit explorers must descend treacherous cliffs, navigate deadly swamps and underground tunnels, and sneak through the evil city of the Nazgûl. Their mission is to keep the Ring from the greedy clutches of Sauron, the Dark Lord.

Documentation for the game includes a special map of Middle-Earth and a guide to the laws, lore, and language of the region. The program costs $39.95 and runs on the IBM PC with DOS 2.0 or higher. You'll need a color graphics card to display the pictures. —*R. F.*

SQL TRAINING

Many companies, including Lotus Development Corp., have or will soon release relational database-management programs that are based on the powerful Structured Query Language. Since IBM researchers developed it throughout the 1970s, the English-like programming language has become an international standard database language. SQL can be used to extract data from mainframes, minicomputers, and personal computers. It takes only a few lines of SQL code to get the same information that would require several pages of code in another language.

Relational Courseware (Boston), has recently released *SQL Tutor*, $195, a disk-based training course that provides a practical understanding of SQL. The course's 17 lessons start with an introduction to SQL and relational databases; progress through SQL queries, data manipulation, data definition, and data control; and end with catalog and report generation.

At the end of the course, you should understand the basic concepts of SQL, be able to construct complex queries, and know how to define SQL tables and indexes and how to generate reports. *SQL Tutor* runs on the IBM PC XT, PC AT, PS/2, and compatible computers and requires at least 128K of RAM (256K on PS/2s). —*R. F.*

SIDEWAYS TO ALLWAYS

Allways is a *1-2-3* add-in from Funk Software (Cambridge, Mass.) that brings presentation-quality, laser-printer output to your Lotus worksheet. With *Allways* you can customize your worksheet's appearance with such features as multiple fonts, shading, outlining of cells and ranges, double underlining, and variable row height.

Allways prints in both portrait (vertical) and landscape (horizontal) modes, but it is limited by a laser's ability to print only one 8½-by-11-inch page at a time. You can, of course, print sections of a huge worksheet and paste them together—but somehow that defeats the purpose of buying an add-in whose aim is to provide better graphics.

In any event, you can use *Allways* with Hewlett-Packard's LaserJet, LaserJet Series II, and DeskJet, as well as with printers that support the PostScript page-description language, such as the Apple LaserWriter. A Funk spokesperson said the program will be available this summer for $149.95 and will run on any IBM PC or compatible that *1-2-3* Release 2/2.01 runs on. —*R. F.*

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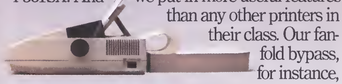

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1-2-3 MACROS

CAN YOU RELATE?

The answer to a reader's question lets us take another look at relational databases.

BY DANIEL GASTEIGER

> *I have a problem that it seems no one can solve. I use* 1-2-3 *as a database for a small, reservations-only restaurant whose menu I select. I try never to serve the same meal twice to my customers unless they specifically request it.*
>
> *I keep two databases on two disks. One database lists the customers' names, home and work phone numbers, and the dates of their visits. The other database lists the menus and the dates on which I offered them. I'd like to have* 1-2-3 *search the customer file to find the dates a patron has eaten at the restaurant. Then I'd like* 1-2-3 *to search the menu file to reveal what dishes the customer has tried.*
>
> *I realize I could type the menu once for each customer's visit, but it seems like there should be a better solution with widespread application.*
>
> *Ralph Wilson*
> *Willow Inn*
> *Waynesburg, Pa.*

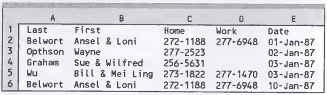
We looked at this problem in January's For Developers column. In that article, Richard Scoville explained the benefits of storing related data sets in separate databases. He also presented a macro that extracts information from one database, then extracts related information from another database.

The solution does have widespread application. Wholesale suppliers might maintain both product and customer databases, with a key field in each to identify which products go to each customer. Similarly, an office's inventory system might use two databases: one that lists the items kept in inventory, and one that lists the distributors of those items. A sales organization might wish to list in one database employment information about its salespeople and in another database the information about the products or territories the salespeople cover. Ralph Wilson's question provides a nice example with which to explore in depth how to extract information from two related databases.

SETTING UP THE DATABASES

Mr. Wilson's databases reside in two worksheets. You might find this arrangement necessary for very large databases; however, for most applications, you can probably store the related databases in one worksheet. We'll come back to the two-database-two-worksheet problem after we see how to perform the extracts in a single worksheet.

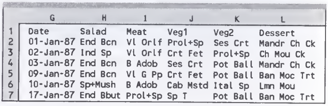
To begin, create a worksheet to match the one shown in figure 1. Set the width of column B to 17: With the cell pointer in column B, select /Worksheet Column Set-Width and enter *17*. Use the same procedure to set the widths of columns C, D, and E to 10. Enter labels as shown, and be sure to start each phone number with a label prefix. Use the @DATE function—@DATE(*yy,mm,dd*)—to enter the dates in column E, then select /Range Format Date 1 to assign a date format to those entries.



	A	B	C	0	E
1	Last	First	Home	Work	Date
2	Belwort	Ansel & Loni	272-1188	277-6948	01-Jan-87
3	Opthson	Wayne	277-2523		02-Jan-87
4	Graham	Sue & Wilfred	256-5631		03-Jan-87
5	Wu	Bill & Mei Ling	273-1822	277-1470	03-Jan-87
6	Belwort	Ansel & Loni	272-1188	277-6948	10-Jan-87

FIGURE 1

Create a second database to match the one shown in figure 2:



	G	H	1	J	K	L
1	Date	Salad	Meat	Veg1	Veg2	Dessert
2	01-Jan-87	End Bcn	Vl Orlf	Prol+Sp	Ses Crt	Mandr Ch Ck
3	02-Jan-87	Ind Sp	Vl Orlf	Crt Fet	Prol+Sp	Ch Mou Ck
4	03-Jan-87	End Bcn	B Adob	Ses Crt	Pot Ball	Mandr Ch Ck
5	09-Jan-87	End Bcn	Vl G Pp	Crt Fet	Pot Ball	Ban Moc Trt
6	10-Jan-87	Sp+Mush	B Adob	Cab Mstd	Ital Sp	Lmn Mou
7	17-Jan-87	End Bbut	Prol+Sp	Sp T	Pot Ball	Ban Moc Trt

FIGURE 2

Set the width of column G to 10 and of column I to 8. Again use the @DATE function to enter the dates in

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column G, then assign the Date 1 format to those entries. The other database items are labels.

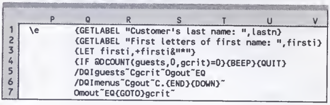
The macro we'll create will refer to each of the databases by name. Assign the range name *guests* to the first database: Select /Range Name Create, enter *guests*, then indicate range A1..E6. Use the same commands to assign the name *menus* to range G1..L7.

THE EXTRACTION MACRO

The macro we'll create will prompt for a customer's name, then extract from the *guests* database the dates that the customer has eaten at the restaurant. Finally, the macro will extract from the *menus* database the menus that were served on those dates. For the macro to accomplish all this, you must prepare Output and Criterion ranges for use in the query operations.

First copy the field names from the *menus* database: Select /Copy and indicate G1..L1 as the From range and cell R14 as the To range. Then enter the label *Last* in cell P14 and the label *First* in cell Q14. This row of labels running from cell P14 to cell W14 will act as field names for the Criterion and Output ranges. Set the width of column Q to 6 and of column R to 10.

Enter labels as shown in figure 3. When an entry begins with a slash (/) or a backslash (\), remember to precede the entry with an apostrophe label prefix.



```
      P        Q        R          S          T          U         V
1  \e          {GETLABEL "Customer's last name: ",lastn}
2              {GETLABEL "First letters of first name: ",firsti}
3              {LET firsti,+firsti&"*"}
4              {IF @DCOUNT(guests,0,gcrit)=0}{BEEP}{QUIT}
5              /DQIguests~Cgcrit~Ogout~EQ
6              /DQImenus~Cgout~C.{END}{DOWN}~
7              Omout~EQ{GOTO}gcrit~
```

FIGURE 3

Assign the macro's name by selecting /Range Name Labels Right, indicating cell P1, and pressing Return. Assign other range names as follows:

Name	**Range**
lastn	**P15**
firsti	**Q15**
gout	**R14**
gcrit	**P14..Q15**
mout	**S14..W14**

You're ready to try the macro. Hold down the MACRO key (Alt on most computers) and press E. *1-2-3* prompts you to enter a customer's last name. Type *Belwort* and press Return. The macro prompts you to enter the first few letters of the customer's first name. Type *A* or *An* (enough to distinguish this customer's name from that of any other family of Belworts) and press Return. The display flickers for a moment, then *1-2-3* displays the Belworts' name, the dates on which they visited the restaurant, and the menus served on each of the dates. Here's how the macro works:

{GETLABEL "Customer's last name: ",lastn} Displays the prompt *Customer's last name:* and stores your response in the cell named *lastn* (cell P15). *Lastn* is within the Criterion range that *1-2-3* will use to extract dates from the *guests* database. When you test-run the macro using our data, *lastn* will contain the label *Belwort*.

{GETLABEL "First letters of first name: ",firsti} Prompts you to enter the first letters of the customer's first name and stores your response in the cell named *firsti*. The cell *firsti* is also within the Criterion range that *1-2-3* will use when it extracts dates from the *guests* database. On your test run of the macro, *firsti* will contain the label *A* (or *An*).

{LET firsti,+firsti&"*"} Appends an asterisk to the entry in the cell named *firsti*. On the test run, this turns the criterion into a wild card meaning "Extract all records whose first names begin with the letter A or with An." On successive runs, this step creates a criterion to search for any first names that begin with the character or characters you entered in response to the macro's second prompt.

{IF @DCOUNT(guests,0,gcrit)=0}{BEEP}{QUIT} Determines whether there is a match in the database for the name you entered in response to the macro's prompts. If the name doesn't appear in the database, this step produces a beep and the macro stops; otherwise, macro control passes to the commands in cell Q5.

/DQIguests~Cgcrit~Ogout~EQ Selects /Data Query Input and enters *guests* as the Input range. Then the macro indicates Criterion and enters *gcrit* as the Criterion range, indicates *gout* as the Output range, and selects Extract Quit. *1-2-3* copies into column R the dates on which the Belworts visited the restaurant.

/DQImenus~Cgout~C.{END}{DOWN}~ Resets two of the Data Query ranges. This command selects /Data Query Input and indicates the *menus* database as the Input range. Then it selects Criterion and assigns *gout* as the Criterion range. However, because *gout* is a single-cell range (cell R14), it is not valid as a Criterion range. The macro simply uses this first assignment of the Criterion range as a point from which to identify the actual range. The command selects Criterion a second time, presses period to anchor the cell pointer, and then presses End DownArrow Return to indicate all the extracted dates in column R as criteria.

Omout~EQ{GOTO}gcrit~ Selects Output from the Data Query menu and enters *mout* (S14..W14) as the Output range. Then the command selects Extract Quit and moves the cell pointer to the top-left corner of the extract area of the worksheet. The patron's name, the dates of the patron's visits, and the menus served on those dates appear starting in row 15 of the worksheet.

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DATA EXTRACTION SUMMARIZED

The step-by-step description of the macro's performance is more confusing than is the actual data-extraction process. The macro prompts you to enter a customer's last name and the first few letters of the customer's first name. The macro sets the *guests* database as the Input range and extracts all dates on which the named guest dined at the restaurant. Then the macro sets the *menus* database as the Input range and uses the extracted dates as criteria for a second Query Extract operation.

When you use this technique in your own models, be sure there is nothing in the worksheet directly below the Output ranges (cells R14 through W14 in our example). As we've designed the model, when *1-2-3* extracts information from the database, it first erases the entire contents of range R15..W8192. This won't be a problem if you place the entire macro and Output ranges well to the right of any data in your worksheet.

TWO DATABASES, TWO WORKSHEETS

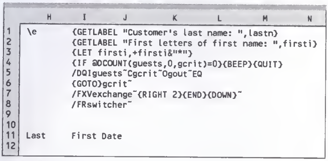
Working with databases in two files is slightly more involved than working with two databases in one file. The actual data-extraction procedure in the macro remains unchanged; however, you must add commands that pass information from one file to the other.

The commands you add are dictated by the computer you're using. The macro will begin in the worksheet that contains the *guests* database. That macro will pass information and control over the worksheet that contains the *menus* database. While *1-2-3* switches worksheets, it must store on disk the information coming from the *guests* database.

If both worksheet files reside on a single disk, *1-2-3* can use the disk to store information while the program switches files. If the worksheets reside on two disks and you have a two-disk system, the macro can use either disk to store information while it switches files. For people with two disks and a single disk drive, the macro must store information in an intermediary worksheet in RAM while you switch disks manually.

Actually, in any of the three cases mentioned, you must create more than one macro to perform the data extractions. Figures 4, 5, and 7 show macros you can use to extract information from worksheets stored on two disks. We'll work through this scenario, then see how to use the same macros when the databases reside on one disk or when your computer has enough drives to use two disks simultaneously.

The macro and associated Data ranges in figure 4 reside in a file named GUESTS, which also contains (in range A1..E6) the database of restaurant patrons shown earlier.



```
         H        I        J           K          L          M          N
 1   \e         {GETLABEL "Customer's last name: ",lastn}
 2              {GETLABEL "First letters of first name: ",firsti}
 3              {LET firsti,+firsti&"*"}
 4              {IF @DCOUNT(guests,0,gcrit)=0}{BEEP}{QUIT}
 5              /DQIguests~Cgcrit~Ogout~EQ
 6              {GOTO}gcrit~
 7              /FXVexchange~{RIGHT 2}{END}{DOWN}~
 8              /FRswitcher~
 9
10
11   Last       First Date
12
```

FIGURE 4

To create the GUESTS file, you can start fresh and enter the database of customers' names, phone numbers, and dates of visits as shown in figure 1 and described in the section titled "Setting Up the Databases." Or you can extract the *guests* database from the existing model to its own file and retrieve that new file. Then set column I to a width of 6, set column J to a width of 10, and enter the labels shown in figure 4. Remember to start with an apostrophe for entries that begin with either a slash or a backslash. Also note that the words *Last*, *First*, and *Date* are individual labels in cells H11, I11, and J11.

Assign range names as follows:

Name	**Range**
guests	**A1..E6**
\e	**I1**
lastn	**H12**
firsti	**I12**
gout	**J11**
gcrit	**H11..I12**
mout	**S14..W14**

NOTICE: TOWN MEETING

Send us your macros tales

You're invited to participate in the *LOTUS* Town Meeting issue that will be published later this year. To take part, send us your best macros tale. Have we published a macro that saved the day for you or a macro that made you madder than blazes? What's the most bizarre application for which you've used a macro? Let us know. We'll print the most interesting and unusual macros tales we receive.

To share your macros experiences with the rest of the *LOTUS* community, we need your response by August 1st, so get cracking! We'll acknowledge all the items we receive, but we cannot return unused material. Send your macros items to:

LOTUS Town Meeting
c/o Daniel Gasteiger
P.O. Box 9123
Cambridge, MA 02139-9123

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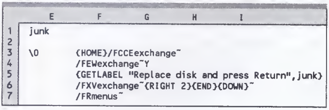
Now save the worksheet under the file name GUESTS.

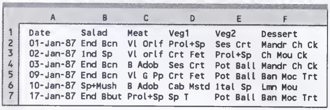
Create a second worksheet as follows: Erase the current worksheet by selecting /Worksheet Erase Yes, then enter labels as shown in figure 5. The backslash-zero entry in cell E3 of that figure begins with an apostrophe label prefix. Assign the labels in column E as names for the adjacent cells of column F: Select /Range Name Labels Right and indicate range E1..E3. Save this worksheet under the file name SWITCHER on the same disk as the GUESTS file.



```
          E          F          G          H          I
 1   junk
 2
 3   \0         {HOME}/FCCEexchange~
 4              /FEWexchange~Y
 5              {GETLABEL "Replace disk and press Return",junk}
 6              /FXVexchange~{RIGHT 2}{END}{DOWN}~
 7              /FRmenus~
```

FIGURE 5

The third worksheet of this application contains the database of menus shown earlier. To create that worksheet, erase the current worksheet, then enter labels and dates as shown in figure 6:



```
          A          B         C        D         E          F
 1   Date       Salad     Meat     Veg1     Veg2      Dessert
 2   01-Jan-87 End Bcn   Vl Orlf  Prol+Sp  Ses Crt   Mandr Ch Ck
 3   02-Jan-87 1nd Sp    Vl orlf  Crt Fet  Prol+Sp   Ch Mou Ck
 4   03-Jan-87 End Bcn   B Adob   Ses Crt  Pot Ball  Mandr Ch Ck
 5   09-Jan-87 End Bcn   Vl G Pp  Crt Fet  Pot Ball  Ban Moc Trt
 6   10-Jan-87 Sp+Mush   B Adob   Cab Mstd 1tal Sp   Lmn Mou
 7   17-Jan-87 End Bbut  Prol+Sp  Sp T     Pot Ball  Ban Moc Trt
```

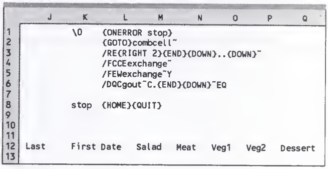
FIGURE 6

Set the width of column A to 10 and of column C to 8, and assign the Date 1 format to the entries in column A. As before, use the @DATE function when you enter the dates in column A. Note that this is the same database you created in columns G through L of figure 2. You could just as well extract the database from the original worksheet to its own file, then retrieve the new worksheet.

In the same worksheet, set the width of column K to 6 and of column L to 10 (we've adjusted column widths in the figure for space considerations). Enter the labels shown in figure 7, then assign range names as follows:

Name	**Range**
menus	**A1..F7**
\0	**L1**
stop	**L8 (omit in Release 1A)**
combcell	**J12**
gout	**L12**

Assign Data ranges for the macro's query operation: Select /Data Query Input, indicate range A1..F7, select Output, indicate range M12..Q12, and select Quit. The macro will assign its own Criterion range. Finally, save the file under the name MENUS on its own disk.



```
         J       K        L          M         N        O        P        Q
 1               \0     {ONERROR stop}
 2                      {GOTO}combcell~
 3                      /RE{RIGHT 2}{END}{DOWN}..{DOWN}~
 4                      /FCCEexchange~
 5                      /FEWexchange~Y
 6                      /DQCgout~C.{END}{DOWN}~EQ
 7
 8               stop   {HOME}{QUIT}
 9
10
11
12   Last        First Date      Salad     Meat     Veg1     Veg2     Dessert
13
```

FIGURE 7

You're ready to test-run the data-extraction macros. Put the disk containing the GUESTS file back in the default data drive and then retrieve that file. Start the worksheet's macro by holding down the MACRO key and pressing E. Here's what happens:

{GETLABEL "Customer's last name: ",lastn} Prompts for the customer's last name and stores your response in *lastn*.

{GETLABEL "First letters of first name: ",firsti} Prompts for first letters of the customer's first name and stores your response in *firsti*.

{LET firsti,+firsti&"*"} Adds an asterisk to the entry in *firsti*, making that entry a wild-card criterion.

{IF @DCOUNT(guests,0,gcrit)=0}{BEEP}{QUIT} Stops the macro if the customer's name doesn't appear in the database.

/DQIguests~Cgcrit~Ogout~EQ Sets *guests* as the Data Query Input range, *gcrit* as the Criterion range, and *gout* as the Output range. Then extracts attendance dates from the matching records to column J.

{GOTO}gcrit~ Moves the cell pointer to the area of the worksheet that now holds a customer's name and the dates of the customer's restaurant visits.

/FXVexchange~{RIGHT 2}{END}{DOWN}~ Saves the customer's visit date data on disk in a file named EXCHANGE.

/FRswitcher~ Retrieves the file named SWITCHER. By retrieving the SWITCHER file, the macro wipes itself and its worksheet out of RAM. However, when *1-2-3* finishes retrieving SWITCHER, the macro named \0 in SWITCHER begins running automatically. Here's what it does:

{HOME}/FCCEexchange~ Moves the cell pointer to cell A1 and combines the file named EXCHANGE into the current worksheet. EXCHANGE contains the customer information extracted from the *guests* database in the GUESTS file. This macro step brings that information into the current worksheet. You may notice that the incoming dates appear only as asterisks in this worksheet, but don't worry, the dates will appear properly when the macros finish running.

/FEWexchange~Y Erases the file named EXCHANGE from disk. Because the macro has combined EXCHANGE's information into the current worksheet,

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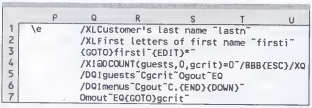
NOTES FOR RELEASE 1A USERS

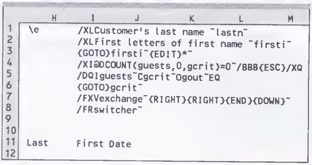
The concepts discussed in this article also apply to *1-2-3* Release 1A. You use the same steps to generate the databases and macros described in the main article. You also assign the same column widths, cell formats, and range names. The differences in Release 1A are in the commands you use within the macros and the ways in which those commands work. Also note that Release 1A Data Query commands are case-sensitive, which means that when you respond to the macro prompts, you must use uppercase and lowercase letters to match your database entries.

The numbers of the illustrations in this box coincide with the numbers of the figures used in the main article. Work through the article, but substitute these illustrations as you go. The macros work almost identically, except that when you manually retrieve the file named MENUS, the macro will fail. Simply clear the resulting error message by pressing the Escape key or Return.



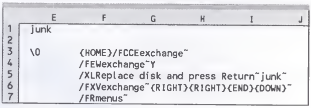
```
        P      Q      R         S          T        U
 1   \e        /XLCustomer's last name ~lastn~
 2             /XLFirst letters of first name ~firsti~
 3             {GOTO}firsti~{EDIT}*~
 4             /XI@DCOUNT(guests,0,gcrit)=0~/BBB{ESC}/XQ
 5             /DQIguests~Cgcrit~Ogout~EQ
 6             /DQImenus~Cgout~C.{END}{DOWN}~
 7             Omout~EQ{GOTO}gcrit~
```

FIGURE 3



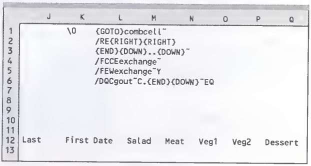
```
        H      I      J         K          L        M
 1   \e        /XLCustomer's last name ~lastn~
 2             /XLFirst letters of first name ~firsti~
 3             {GOTO}firsti~{EDIT}*~
 4             /XI@DCOUNT(guests,0,gcrit)=0~/BBB{ESC}/XQ
 5             /DQIguests~Cgcrit~Ogout~EQ
 6             {GOTO}gcrit~
 7             /FXVexchange~{RIGHT}{RIGHT}{END}{DOWN}~
 8             /FRswitcher~
 9
10
11   Last      First Date
12
```

FIGURE 4



```
        E       F          G         H         I        J
 1   junk
 2
 3   \0         {HOME}/FCCEexchange~
 4              /FEWexchange~Y
 5              /XLReplace disk and press Return~junk~
 6              /FXVexchange~{RIGHT}{RIGHT}{END}{DOWN}~
 7              /FRmenus~
```

FIGURE 5



```
        J       K       L       M       N       O       P       Q
 1            \0   {GOTO}combcell~
 2                 /RE{RIGHT}{RIGHT}
 3                 {END}{DOWN}..{DOWN}~
 4                 /FCCEexchange~
 5                 /FEWexchange~Y
 6                 /DQCgout~C.{END}{DOWN}~EQ
 7
 8
 9
10
11
12  Last      First Date   Salad   Meat    Veg1    Veg2    Dessert
13
```

FIGURE 7

there is no need to maintain a copy of the information on disk. Besides, you're about to replace that disk with a different one.

{GETLABEL "Replace disk and press Return", junk} Prompts you to replace the disk and press Return. At this point, you should place in the disk drive the disk that contains the *menus* database.

/FXVexchange~{RIGHT 2}{END}{DOWN}~ Creates a file named EXCHANGE on the new disk and saves a copy of the customer's information on disk so that the information won't be lost when the macro retrieves the MENUS file.

/FRmenus~ Retrieves the file named MENUS.

The File Retrieve command wipes out the worksheet currently in RAM and replaces it with the MENUS file. The MENUS worksheet contains an auto-executing macro that works as follows:

{ONERROR stop} Begins error trapping. If an error arises while the macro is running, macro control will shift directly to the cell named *stop*.

{GOTO}combcell~ Moves the cell pointer to the cell named *combcell*. *Combcell* coincides with the top-left corner of the area of the worksheet that contains the database Criterion and Output ranges.

/RE{RIGHT 2}{END}{DOWN}..{DOWN}~ Erases any entries that might currently reside in columns J, K, and L below row 12 of the worksheet. This prepares the area for incoming data.

/FCCEexchange~ Combines the data from the EXCHANGE file into the current worksheet. The arrangement of the incoming file exactly matches the layout of range J12..L12 and the rows below it. Hence cell J13 receives the customer's last name, cell K13 receives the customer's first name wild card, and column L receives the list of dates on which the customer visited the restaurant.

/FEWexchange~Y Erases from disk the file named EXCHANGE. Because that file's information is now in RAM, there is no need to retain a copy of the file on disk.

/DQCgout~C.{END}{DOWN}~EQ Sets the Criterion range to include all the new dates that are listed in the *Date* column (column L) and extracts the menu items that are served on those dates. The menus appear in columns M, N, O, P, and Q.

The {ONERROR} command in this macro stops the macro when you retrieve the worksheet manually. When the linked macros retrieve this worksheet, a file named EXCHANGE is on the disk, and the macro combines that file into the worksheet. However, when you retrieve the worksheet, there is no file named EXCHANGE on disk; the File Combine command fails and would normally cause an error condition if not for the {ONERROR} statement.

ANOTHER SUMMARY

The process we've described seems quite involved, yet it's easy to summarize. The macro in the GUESTS file determines on what dates a patron ate at the restaurant. It stores those dates in a file on disk, then retrieves a file named SWITCHER.

A macro in the SWITCHER file combines the customer's visit dates into the worksheet, erases the disk file that contains those dates, and lets you replace the GUESTS disk with the MENUS disk. Then the macro saves the customer's visit dates on the MENUS disk and retrieves the MENUS file.

The macro in the MENUS file combines the customer's visit dates and erases the disk file that contains them. It then extracts the menus that were served on the dates the customer visited.

TWO FILES, ONE DISK

To modify this system so that it works with two files stored on a single disk, don't create the intermediary file named SWITCHER. Simply omit that worksheet from the disk, and replace the file name SWITCHER in cell I8 of the macro in the GUESTS file with the name MENUS.

By the same token, omit the SWITCHER file if you have a two-disk system. In this case, you should start with the GUESTS disk in the default disk drive and put the MENUS disk in the second drive. Cell I8 of the macro in the GUESTS file should identify the drive that contains the MENUS file. For example, if B is the default drive and contains the GUESTS file, then the MENUS file will be in drive A. The command in cell I8 of the GUESTS file's macro should read /FR{ESC 2}a:\menus~ (/FRa:menus~for Release 1A users—see box). ■

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If you have questions about macros, send them to us. If you have a favorite macro technique you'd like to share, we'd like to see it. If we use your letter in a column, we'll send you $25. Write to: Macros Editor, LOTUS *Magazine, P.O. Box 9123, Cambridge, MA 02139–9123.*

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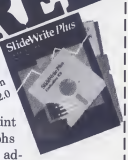

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SYMPHONY MACROS

FASTER MACROS

A collection of techniques that can streamline macro processing

BY DANIEL GASTEIGER

Many of the letters I receive showcase macros and ask the question, "How can I make these macros run more quickly?" Techniques that can speed up macros vary from one application to the next, and most of the applications I see are too specific to present in this column. Rather than examine one application, let's look at some rules to speed up almost any macro-driven worksheet you create.

EFFICIENCY FUNDAMENTALS

To regular readers of this column, these "efficiency fundamentals" will sound like my basic macro-writing philosophy: The most important issue in writing efficient macros is in knowing when macros are inappropriate. In many cases, if you can eliminate the macros from an application, the application will be more efficient.

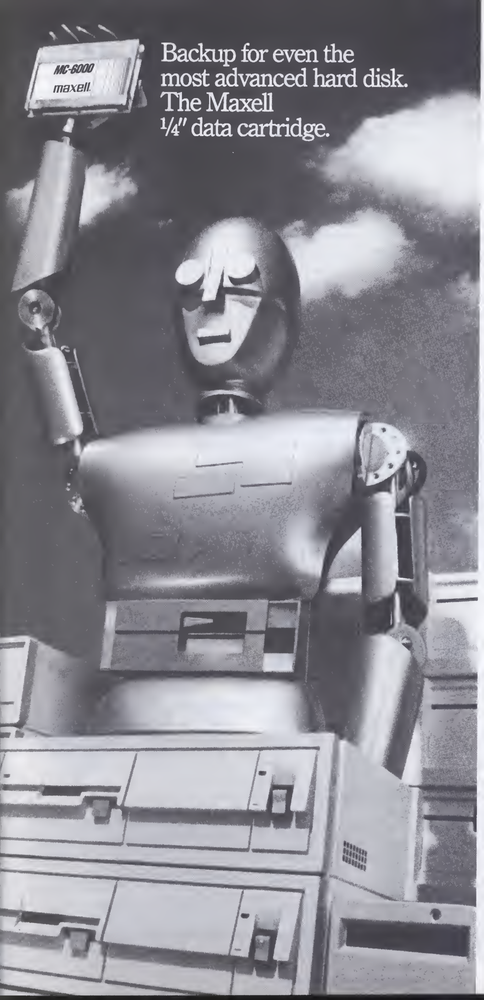
I refer specifically to macros that perform tasks you can do faster manually. For example, imagine you've entered a list of names in the worksheet and you later decide to enter the names as records into a database. You could write a macro to type the names one by one into separate records of a FORM window. However, you can save time by working in a SHEET window. You can copy the names directly into the appropriate column of the database, then reset the Database range to encompass the new entries.

This minimalist macros philosophy still applies once you decide that you must write a macro: Write macros that exploit *Symphony*'s nonmacro facilities. Some of the worst macros I've seen fail to use *Symphony*'s most fundamental capabilities.

For example, I've seen several macros that move the cell pointer to a cell and press EDIT Return, move the cell pointer to a cell and press EDIT Return, move the cell pointer, and so on. Pressing EDIT Return causes the formula in the current cell to recalculate. The macros in these cases are controlling the recalculation order of the spreadsheet.

Recalculating each cell individually and in a specific order can resolve some very complex problems. However, macros that do this overlook the spreadsheet's built-in recalculation mechanisms. Right out of the package, *Symphony* calculates properly written formulas in the order dictated by their dependencies. Formulas that depend only on raw values calculate first, then the formulas that depend on those formulas calculate, and so on. Almost any collection of formu-

DIRK HAGNER



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Maxell Corp. of America, 22-08 Route 208, Fair Lawn, NJ 07410 las, no matter how it's arranged in the worksheet, will calculate in this "natural order."

Sometimes it's important to control the order in which formulas calculate. For those occasions, macros that recalculate each cell sequentially would be too slow, so you should set *Symphony*'s recalculation order to Column-by-Column or Row-by-Row (in a SHEET window select MENU Settings Recalculation Order). Then you can design the worksheet so that formulas that must calculate first fall in the leftmost columns or topmost rows.

This discussion is meant to emphasize that if you must write a macro, make it run quickly by using the appropriate *Symphony* capabilities. Don't create macros that duplicate the function of a FORM or DOC window. Consider that certain @functions can manipulate labels and values more efficiently than the macro processor can.

CONTROL RECALCULATION

Worksheet recalculation eats macro-processing time. The more formulas your worksheet contains, the longer it takes to recalculate. And a macro that forces (or requires) frequent recalculation of the entire worksheet is bound to be slow.

Many macros will run more quickly if you set the recalculation method to Manual. To do this, start in a SHEET window. Select MENU Settings Recalculation Method Manual Quit. Be aware that you might need to redesign your macro to accommodate this recalculation mode.

With recalculation set to Manual, the current values of formulas should always be suspect. If your macro changes any values, make sure it also recalculates any associated formulas, but don't have it recalculate more cells than necessary.

Use {RECALC} and {RECALCCOL} commands in place of the {CALC} command. These commands recalculate specified ranges, unlike the {CALC} command, which recalculates the entire worksheet. Particularly in large worksheets, selective recalculation can provide considerable savings in processing time.

SHORTEN RANGE NAMES

Depending on the macro you're writing, you might give it a slight speed edge by using short range names. The length of a range name doesn't affect the processing time of a *Symphony* Command Language command. For example, the expression {BRANCH loop} takes just as long to process as the expression {BRANCH backtothetop}.

However, when a macro encounters a range name in a menu sequence or in conjunction with a function-key name, the macro must type out the entire

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By William J. Spink

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Walt Casey, V.P. of Communications at ConAgra says, "I spend a lot of time each day poking into this and tracking that. It's *much* easier when you can immediately get the facts from a computer, rather than having to make a series of phone calls."

"One of Dow Jones News/Retrieval's services, QuickSearch, is a Godsend," adds Jim Posner, a respected retail consultant. "It gives me detailed corporate reports within minutes—I don't even have to leave the office.

Instant information: the executive advantage.

To lead in today's marketplace, you need information like *that*," Lynch says, snapping his fingers.

He recalls an example of how Dow Jones News/Retrieval®—the business and financial information service from Dow Jones & Company, Inc.—gave JCPenney Company a real advantage.

"Let's just say that a 'major player' in our industry was being acquired. Within a few hours we knew more about the takeover candidate than the bidder did. Honestly, we knew more than some investment bankers did.

Decision-making with the leading edge.

"Then we started getting the corporate insider trading data," Lynch continues. "It showed us some things that influenced a major deal.

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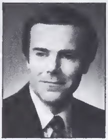
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"This service really makes a difference in the day-to-day running of your business. It can pay for itself very quickly."

Surprisingly easy.

All you need to access the service is a PC and modem. Using the service is "No problem," according to Posner.

"There's no difficulty using the service. I ask for pointed, specific information and get exactly what I need. It's much easier than manual research."

Walt Casey agrees. "Dow Jones News/Retrieval is simple enough for anyone who's at all comfortable with computers to use it effectively from their very first day online."

Making the right decision.

There are hundreds of online information services, many offering business data. How can you pick the best *one*?

"It was apparent from the first step that the most useful system was Dow Jones News/Retrieval," remembers Casey. "It offers so much of the information you're looking for—from general news and stock quotes, to data on our company and industry. It was the best single source."

"I've had other services, but Dow Jones News/Retrieval has the most useful business information in the right form," says Posner. "The time I spend 'playing' on the computer makes more money for me—and for my clients."

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range name. For example, when a macro processes the expression {GOTO}accounts~, it presses the GOTO key, then types the word *accounts*, as you would if you were issuing the command manually. If your macro must indicate ranges in this manner, keep the range names short. Significant differences in the lengths of range names can account for as much as a 10% change in macro speed.

DON'T USE MENU SEQUENCES

Symphony's menus provide access to hundreds of ways for manipulating data. As I said earlier, you should exploit those options extensively when you write macros, but whenever possible you should replace a macro's menu sequences with analogous Command Language commands.

A macro uses the menus much as you do, albeit a little faster. Command Language commands bypass *Symphony*'s user interface so that they can operate efficiently. (A user interface is the collection of mechanisms by which computer software interacts with its users—the display, menus, and so on.) On my IBM PC AT, a sequence of 50 simple Copy commands (using the commands MENU Copy) processed in 20 seconds. When I substituted a {LET} command for the MENU Copy menu sequence, the processing time dropped to one second.

Even when I used the {PANELOFF} and {WINDOWSOFF} commands (which prevent updating the display while a macro is running) and set worksheet recalculation to Manual, I shaved only three seconds off the processing time of the macro that used the menu sequence. (We'll discuss these options more later.)

DON'T MOVE THE CELL POINTER

The fastest macros never move the cell pointer. This means that you must name cells and ranges and use Command Language commands in place of menu sequences.

Try to design models with data laid out as tables. In that format, you can use @INDEX functions to get information out of the tables and the {PUT} command to put information into the tables. Neither of these mechanisms requires movement of the cell pointer. If speed is your only consideration, use {GETLABEL} commands and user-defined menus to display messages in the control panel. Don't have your macros write messages in the spreadsheet or move the cell pointer to areas that already contain messages. A macro that relies heavily on windowing is particularly time-consuming.

PRESET RANGES

All macros that print, perform database operations, act on graphs, or work in a COMM window might involve settings sheets. You'll decrease the processing times of such macros by presetting as many parameters as possible.

MULTIPLE DRIVER SETS

To create a driver set, exit from *Symphony* and return to the DOS prompt. Make sure you're in the directory that contains the *Symphony* program files, then enter *install*.

After a moment, the Install program displays a screen of information explaining the purpose of the program. Follow the on-screen instructions until the Install program displays a menu. From that menu select Change Selected Equipment. Then select Screen Display and select One Monitor. Answer Yes to the question *Do you want graphs and text together?* Then select the appropriate item from the list of drivers.

From the menu that appears, select Save Changes, then enter a name for the driver set. One appropriate file name for a driver set that provides a shared-mode display (see main text) is SHARED. The Install program creates a new driver set and presents you with the option to exit from the Install program or return to the main menu. Return to the main menu and work through the install procedure once more. This time select No when the Install program asks whether you want graphs and text together. Save this second driver set under a unique file name such as TOGGLE. Then exit from the Install program.

For *Symphony* Releases 1 and 1.01, things look a little different once you start the Install program. At the first prompt after you start Install, press the Spacebar. Select 1 from the resulting menu, and press the Spacebar in response to the next two prompts.

Enter the file name SHARED for your first driver set. Then follow on-screen instructions to select the appropriate shared-mode driver for your display. Continue through the rest of the install sequence, selecting appropriate printer and communications drivers, and follow the instructions for saving the driver set.

To create the toggle-mode driver set, you must work through the entire installation procedure a second time. Select 1 from the main menu, and continue as you did for the first driver set.

To start *Symphony* with one of these driver sets, start in the DOS directory that holds the *Symphony* program files. To use the shared-mode driver, enter *symphony shared* (or substitute for *shared* the name that you gave your shared-mode driver). Likewise, to use the toggle-mode driver, enter *symphony toggle* at the DOS prompt.

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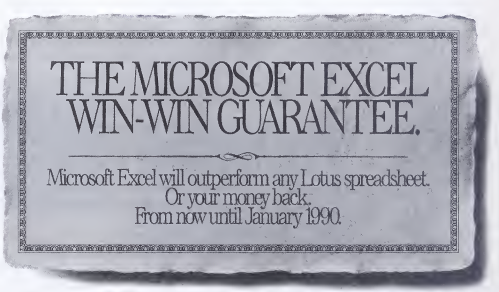

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For example, by writing the necessary steps as code, you can have a macro generate a graph from data stored in the worksheet. However, you can just as easily create the graph yourself and give the Graph settings sheet a unique name. If the macro needs to work with the graph, it can simply recall the appropriate settings sheet.

The same rule applies to using range names. Some macros must rely on a worksheet's ever-changing layout to determine where to assign a range name. (Barring that necessity, your macros should almost never assign range names.) If you know where a macro must assign a range name, simply assign the name yourself and eliminate the naming steps from the macro code.

DISABLE SCREEN UPDATES

If your macro moves the cell pointer around or if it switches you from window to window as it runs, shave off a few seconds of processing time by disabling the display. A macro loses time while it waits for *Symphony* to redraw the current window every time something changes in the spreadsheet.

You can use the {WINDOWSOFF} command to keep *Symphony* from unnecessarily updating the display. Simply include this command as the first step of any macro that you don't need to observe in action. Place a {WINDOWSON} command near the end of the macro so that *Symphony* will redraw the display once the macro has finished making changes.

I created a test macro that moves the cell pointer off-screen 50 times. The macro took about 20 seconds to run on my IBM PC AT. I then incorporated the {WINDOWSOFF} and {WINDOWSON} commands and reduced its processing time to 17 seconds.

USE SMALL WINDOWS

Even with the display disabled, *Symphony* keeps track of how the screen looks while a macro runs. Knowing that, you can significantly reduce a macro's processing time by having it run in a very small window.

I used the macro that moves the cell pointer off-screen to test this behavior. The original macro ran for 20 seconds in a screen-size, isolated window. (To isolate a window, make the window current and select SERVICES Window Isolate.) When I reduced the window's size to its minimum (by selecting SERVICES Window Layout, pressing Home, Return, and selecting Quit), the macro ran in about seven seconds.

The macro's total processing time dropped to four seconds when I combined the small-window technique with the use of the {WINDOWSOFF} command. This combination of using a small, isolated window and disabling window updates provided the greatest time savings across all the macros I tested—often reducing the processing time by more than 70%.

Unfortunately, the small-window technique isn't appropriate for use with every macro, but if your macro runs without intervention for several minutes in a SHEET window, try reducing the size of that window and see if the macro runs more quickly.

USE A FAST DRIVER

Symphony's ability to redraw the display quickly is a major factor in processing speed. It follows, then, that you should use a fast display driver in your *Symphony* driver set.

When you install *Symphony* (in DOS go to the directory that holds your *Symphony* program files and enter ***install***), you can select from among several graphics display drivers. Some drivers let *Symphony* display graphs and text simultaneously (shared mode), while others let you view either graphs or text but not both at once (toggle mode).

The toggle-mode drivers redraw the screen in a work session faster than shared-mode drivers can. If you often run long macros, make sure you use a toggle-mode driver.

You may find the toggle-mode driver inappropriate for all your needs. For example, some macros intentionally show graphs and text in a single display. In that case, create two driver sets that are identical except for the screen-display mode. (See the box for instructions on creating and using two driver sets.)

STAY TUNED

Improving processing speed begins with careful macro design. Once you've learned a few time-saving techniques, you'll find many applications where those techniques apply. ■

NOTICE: TOWN MEETING

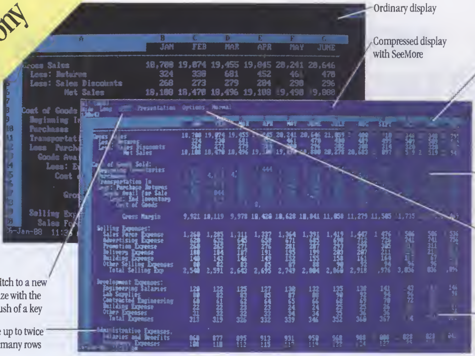
Send us your macros tales

You're invited to participate in the *LOTUS* Town Meeting issue that will be published later this year. To take part, send us your best macros tale. Have we published a macro that saved the day for you or a macro that made you madder than blazes? What's the most bizarre application for which you've used a macro? Let us know. We'll print the most interesting and unusual macros tales we receive.

To share your macros experiences with the rest of the *LOTUS* community, we need your response by August 1st, so get cracking! We'll acknowledge all the items we receive, but we cannot return unused material. Send your macros items to:

LOTUS Town Meeting
c/o Daniel Gasteiger
P.O. Box 9123
Cambridge, MA 02139-9123

For 1-2-3 and Symphony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Very Small	128x25	150x51	128x53	144x43	N/A
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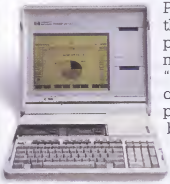

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ACCOUNTING

WITH SINCERE DEPRECIATION, PART 2

Cranking out tax- and book-depreciation figures is a snap with this worksheet—no matter what the assets.

BY CHARLES W. KYD

As you probably gleaned from last month's column, calculating depreciation can be a tricky undertaking. If depreciation were not tax deductible, many small companies might ignore it. But since it is deductible, most firms calculate depreciation for tax purposes. To save work, some companies use tax depreciation in financial reporting. Tax depreciation usually exceeds the straight-line depreciation that is allowed by accepted accounting principles, so these firms may overstate expenses and understate income in financial statements. This month, we'll complete the spreadsheet begun last month and learn how it can calculate both tax depreciation (for reports to the IRS) and book depreciation (for reports to everyone but the IRS).

To proceed with this article, you must have completed the first portion of the worksheet (ranges A1..N8 and A10..E16) from the instructions in last month's article. The model requires *1-2-3* Release 2/2.01 or *Symphony*. The figure shows the depreciation ratios worksheet divided into three sections. The first section, which was described last month, calculates annual depreciation ratios. The entries in range D12..D14 cause formulas in rows 5 through 8 to return ratios allowed under the Modified Accelerated Cost Recovery System (MACRS). The second section lists ratios in a small database, with a set of ratios for every type of asset held by your company. The third section uses this information to calculate both book and tax depreciation for all prior periods and for the most recent 12 months.

Charles W. Kyd is the author of Financial Modeling Using 1-2-3 *(Osborne/McGraw-Hill, 1986) and a consultant in Seattle.*

COMPLETING THE WORKSHEET

Retrieve the spreadsheet you created from the instructions in last month's column. Enter the labels and underlines shown in range G10..M16 (don't enter anything in range K13..K14 yet) and in rows 18 through 20. To create underlines, enter a backslash and either a hyphen or an equal sign (\– or \=). Center the labels in cells B20 and C20: Select /Range Label Center (in *Symphony*, MENU Range Label-Alignment Center) and specify range B20..C20. Copy range D3..N3 to cell D20. Enter a backslash and asterisk (*) in cell A21, and copy cell A21 to ranges B21..N21 and A30..N30.

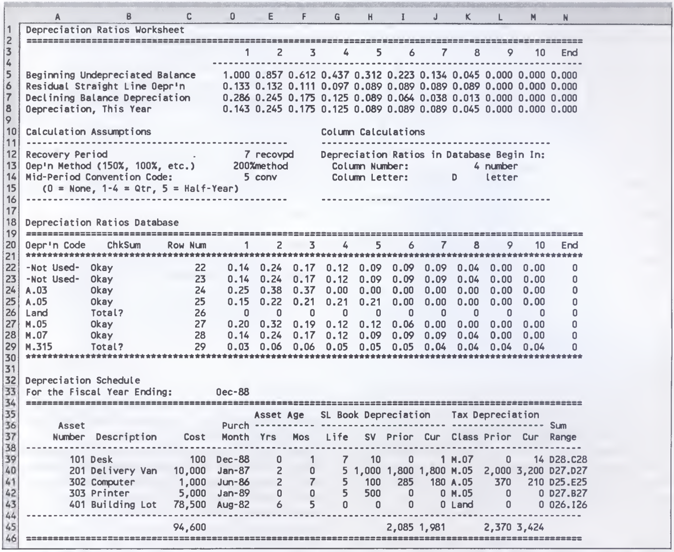
Enter the labels shown in range A22..A29; precede the labels in cells A22 and A23 with apostrophes. Each label indicates the depreciation method used for its row. We've used the letter A to indicate the Accelerated Cost Recovery System (ACRS) and the letter M to indicate MACRS. The numbers indicate the number of recovery years used; for example, .03 equals 3 years, .315 equals 31.5 years. The word *Land* indicates land assets. Enter the following formula in cell B22:

```
@IF(@ROUND(@SUM($D22..$N22),4)=1,
  "Okay","Total?")
```

Enter the formula @CELL("row",D22..D22) in cell C22. Copy range B22..C22 to range B23..B29. Initially, all the formulas in range B22..B29 return the string *Total?*.

Enter the formula +D$8 in cell D22. Copy cell D22 to range D22..M23, then copy cell D22 to range D27..M29. Assign the Fixed format with two decimal places to ranges D22..M25 and D27..M29: Select /Range (in *Symphony*, MENU) Format Fixed, press Re-

DIRK HAGNER



```
        A             B          C      D     E     F     G     H     I     J     K     L     M     N
1   Depreciation Ratios Worksheet
2   =====================================================================================================
3                                        1     2     3     4     5     6     7     8     9    10   End
4                                     -----------------------------------------------------------------
5   Beginning Undepreciated Balance   1.000 0.857 0.612 0.437 0.312 0.223 0.134 0.045 0.000 0.000 0.000
6   Residual Straight Line Depr'n     0.133 0.132 0.111 0.097 0.089 0.089 0.089 0.089 0.000 0.000 0.000
7   Declining Balance Depreciation    0.286 0.245 0.175 0.125 0.089 0.064 0.038 0.013 0.000 0.000 0.000
8   Depreciation, This Year           0.143 0.245 0.175 0.125 0.089 0.089 0.089 0.045 0.000 0.000 0.000
9
10  Calculation Assumptions                           Column Calculations
11  ---------------------------------------------     ----------------------------------------
12  Recovery Period               .       7 recovpd   Depreciation Ratios in Database Begin In:
13  Dep'n Method (150%, 100%, etc.)     200%method      Column Number:            4 number
14  Mid-Period Convention Code:           5 conv        Column Letter:       D     letter
15     (0 = None, 1-4 = Qtr, 5 = Half-Year)
16  ---------------------------------------------     ----------------------------------------
17
18  Depreciation Ratios Database
19  =====================================================================================================
20  Depr'n Code   ChkSum      Row Num      1     2     3     4     5     6     7     8     9    10   End
21  *****************************************************************************************************
22  -Not Used-   Okay              22   0.14  0.24  0.17  0.12  0.09  0.09  0.09  0.04  0.00  0.00     0
23  -Not Used-   Okay              23   0.14  0.24  0.17  0.12  0.09  0.09  0.09  0.04  0.00  0.00     0
24  A.03         Okay              24   0.25  0.38  0.37  0.00  0.00  0.00  0.00  0.00  0.00  0.00     0
25  A.05         Okay              25   0.15  0.22  0.21  0.21  0.21  0.00  0.00  0.00  0.00  0.00     0
26  Land         Total?            26      0     0     0     0     0     0     0     0     0     0     0
27  M.05         Okay              27   0.20  0.32  0.19  0.12  0.12  0.06  0.00  0.00  0.00  0.00     0
28  M.07         Okay              28   0.14  0.24  0.17  0.12  0.09  0.09  0.09  0.04  0.00  0.00     0
29  M.315        Total?            29   0.03  0.06  0.06  0.05  0.05  0.05  0.04  0.04  0.04  0.04     0
30  *****************************************************************************************************
31
32  Depreciation Schedule
33  For the Fiscal Year Ending:       Dec-88
34  =====================================================================================================
35                                          Asset Age   SL Book Depreciation   Tax Depreciation
36        Asset                       Purch -----------  ---------------------- ----------------- Sum
37       Number Description     Cost  Month Yrs   Mos   Life    SV Prior   Cur Class Prior   Cur Range
38  -----------------------------------------------------------------------------------------------------
39          101 Desk             100  Dec-88   0     1     7    10     0     1 M.07      0    14 D28.C28
40          201 Delivery Van  10,000  Jan-87   2     0     5 1,000 1,800 1,800 M.05  2,000 3,200 D27.D27
41          302 Computer       1,000  Jun-86   2     7     5   100   285   180 A.05    370   210 D25.E25
42          303 Printer        5,000  Jan-89   0     0     5   500     0     0 M.05      0     0 D27.B27
43          401 Building Lot  78,500  Aug-82   6     5     0     0     0     0 Land      0     0 D26.I26
44  -----------------------------------------------------------------------------------------------------
45                            94,600                                2,085 1,981       2,370 3,424
46  =====================================================================================================
```

This depreciation worksheet contains three sections; instructions for creating the first section (ranges A1..N8 and A10..E16) were detailed last month. Range G10..M16 contains formulas that return the column number and column letter of the leftmost column of the Depreciation Ratios Database. The values in range D24..M29 are entered manually or entered as formulas and then converted to values; in this way they reflect the values resulting from various sets of entries in cells D12 and D13. Formulas in range G39..M43 return depreciation values for specific assets.

turn to accept the default of two decimal places, and specify the desired range. Enter the values shown in range D24..M26 (in practice, you will look up these values in the ACRS tables issued by the IRS). Make sure that the values in range D12..D14 are the same as those shown in the figure, then press the CALC key and change the formulas in row 28 into values: Select /Range Value (in *Symphony*, MENU Range Values), and specify range D28..M28 as the From range and cell D28 as the To range. Change the value in cell D12 to 5, press the CALC key, and convert the formulas in range D27..M27 to values. Finally, change cell D12 to 31.5, press the CALC key, and convert the formulas in range D29..M29 to values. Then change the entry in cell D12 back to 7 and press CALC.

Enter 0 in cell N22, and copy that cell to range N23..N29. Then assign the range name *dep* to range A21..N30: Press slash (in *Symphony*, MENU), select Range Name Create, enter *dep*, and specify range A21..N30. Assign the labels in range L13..L14 as range names for the cells to their left: Press slash (in *Symphony*, MENU), select Range Name Labels Left, and specify range L13..L14. Then enter the column-calculation formulas: In cell K13 enter the formula @CELL("col",$D$20..$D$20). In cell K14 enter the formula @CHAR(number + 64). The first of these formulas returns the column number for the first column of ratios in the database. The second formula converts this number into a column letter.

CREATE THE DEPRECIATION SCHEDULE

Enter the labels and underlines shown in rows 32 through 38, as well as the underlines in rows 44 and 46. (The actual locations of labels in row 35 are cells

E35, G35, and K35.) Note that cells F36, J36, and M36 contain an apostrophe and five hyphens instead of a backslash and hyphen. Right-align the labels in range A36..D37, and center the labels in range E37..M37. Assign a date format to cell D33: Select /Range (in *Symphony*, MENU) Format Date 3 and specify cell D33. Now enter the formula @DATE(88,12,1) in cell D33. Assign the name *date* to this cell. Assign the same date format to range D39..D43, then enter the dates shown in that range, using the format @DATE(*year-number, month-number*,1). Enter the values and labels shown in range A39..C43.

Assign the comma format with no decimal places to range C39..C45. Select /Range Format, select the comma, enter 0, and specify range C39..C45. (In *Symphony* select MENU Format Punctuated, enter 0, and specify range C39..C45). Then assign the same format to ranges H39..J39 and L39..M39.

Enter the formulas shown in the table above right.

Copy range E39..N39 to range E40..E43. Replace the formula that's now in cell H43 with 0. Then enter the values shown in range G39..G43 and the labels shown in range K39..K43. To finish the worksheet, enter the formula @SUM(C38..C44) in cell C45, and copy cell C45 to ranges I45..J45 and L45..M45. Then press the CALC key.

WHAT IT MEANS, HOW IT WORKS

The database in rows 18 through 30 gives the depreciation ratios for all the possible types of assets the company owns. Here we see that there can be 3-year and 5-year assets that qualify for ACRS; 5-year, 7-year, and 31.5-year assets that qualify for MACRS; and land assets. Since the values in this area (except for those in rows 22 and 23) are entered manually or calculated and then frozen with the Range Values command, they form a permanent database (or, more accurately, a lookup table) that the Depreciation Schedule section can take values from.

Each string-returning @IF formula in column B of the Depreciation Ratios Database section returns the label *Okay* if the total of the values in its row, rounded to four decimal places, is equal to 1. (This is because the yearly depreciation ratios that fully depreciate an asset add up to 1.) If the formula returns the label *Total?*, there may be a problem with the values in that row, although sometimes you may have to ignore the message. Row 26, for example, is for land assets. IRS rules state that land may not be depreciated, and therefore columns D through M contain zeros. Since these values don't add up to 1, the formula in cell B26 indicates a problem even though there isn't one. Cell B29 also indicates a problem. This is because the values in row 29 reflect only the first 10 years of a 31½-year recovery period. The only way to correct the problem would be to add 22 new columns between columns M and N (placing the column N entries in column AJ), copying range M2..M30 to range N2..AI2, then reissuing the Data Fill or Range Fill commands to place year numbers in rows 3 and 20. You would then copy range D23..AI23 to cell D29, enter *31.5* in cell D12, recalculate the worksheet, and convert range D29..AI29 to values.

Cell	**Formula**
E39	@IF(D39>$date,0,@INT(@YEAR($date) − @YEAR(D39) + (@MONTH($date) − @MONTH(D39))/12 + 1/12))
F39	@IF(D39>$date,0,12*(@YEAR($date) − @YEAR(D39)) + @MONTH($date) − @MONTH(D39) + 1 − 12*E39)
H39	0.1*C39
I39	@IF(G39*E39,(E39 − 1 + F39/12)*((C39 − H39)/G39),0)
J39	@IF(G39#AND#(E39 + F39),@IF(E39>0,12,F39)/(12*G39),0)*(C39 − H39)
L39	+ C39*@IF((E39 + F39/12)< = 1,0,@SUM(@@(N39)))
M39	+ C39*@IF(D39>$date,0,@VLOOKUP(K39,$dep,E39 + (F39>0) + 2))
N39	($letter&@STRING(@VLOOKUP(K39,$dep,2),0)&"."&@CHAR($number + E39 + (F39>0) − 2 + 64)&@STRING(@VLOOKUP(K39,$dep,2),0))

The Depreciation Schedule returns depreciation values for specific assets held by the firm. The formulas in columns E and F give the ages of the assets in years and months. If the date of purchase of a given asset is after the end of the current fiscal year, the column E and column F formulas for that asset both return 0. Furthermore, both formulas add an additional month to the asset's age. If this weren't so, the formulas would return the age at the beginning of the month in cell D33 rather than at the end.

The formulas in column H, under the heading *SV*, tell you the salvage values of the assets; they simply multiply the costs in column C by 0.1.

Formulas in columns I and J return prior and current straight-line book depreciations for the assets. They reflect the assumption that the date in cell D33 is at the end of the fiscal year. For the purposes of this article, prior depreciation is equal to all depreciation until one year ago; current depreciation is equal to the most recent 12 months of depreciation.

The formulas for tax depreciation, columns L and M, might be a bit hard to follow. Each prior-depreciation formula in column L multiplies the cost of the asset by an expression that equals 0 if the age of the asset is one year or less, but otherwise equals the value of an @SUM expression. Through the use of the @@ function, the formula uses the string in column N as the range argument of the @SUM expression. (For more on the @@ function, see "Clever Calculation Routines" in the April issue.)

The current depreciation formulas in column M also multiply the asset's value by an @IF expression. This expression returns 0 if the purchase date of the asset is greater than the date in cell D33. If such is not the case, the expression returns the value of an @VLOOKUP expression that uses the asset class in column K as the lookup value, *dep* as the lookup range, and a value based on the asset's age as the offset column. (Check your *1-2-3* or *Symphony* documentation for more on the @VLOOKUP function.)

> SOME COMPANIES USE TAX DEPRECIATION IN FINANCIAL STATEMENTS. BY DOING SO, THEY MAY BE OVERSTATING EXPENSES AND UNDERSTATING INCOME.

Each formula in range N39..N43 creates a character string by piecing together (1) the letter in cell K14, (2) the string equivalent of the row value in column C of the ratios database that matches the asset class listed in column K, (3) a single period, (4) the column letter equivalent of the sum of the value in cell K13 and the asset's age, and (5) the string equivalent of the row value again. As you can see in range N39..N43, these strings resemble range references. They are used, as mentioned earlier, as part of @@ functions in the column L formulas.

Save this worksheet and use it to determine depreciation values for your own firm's assets. The depreciation codes in column A of the ratios database are arbitrary; you can replace them with any codes you choose. You can add a new category to the database at any time. Insert a new spreadsheet row anywhere between the rows of asterisks, enter the appropriate code in column A in the new row, and copy range B22..N22 into the new row. Then enter the values that go with the category in range D12..D13. For example, if the new category calls for a 9-year recovery period and the MACRS system, enter the value 9 in cell D12 and the value 2 in cell D13 and press the CALC key. Then, in the new row, convert formulas to values in columns D through M with the Range Value (in *Symphony*, Range Values) command.

Adapt the depreciation schedule by replacing the entries in columns A, B, C, D, G, and K with entries appropriate to your assets. Again, you can add new rows to this range as necessary. ■

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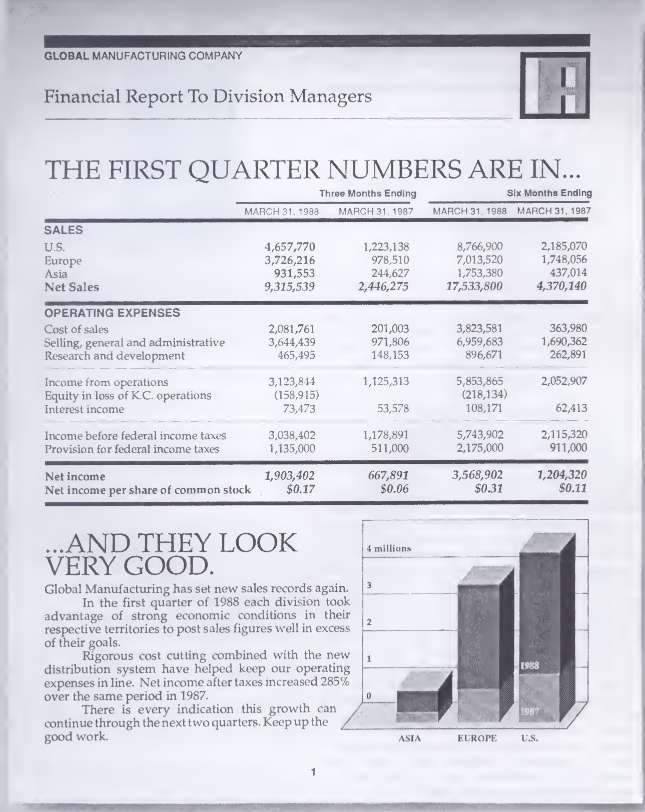

GLOBAL MANUFACTURING COMPANY

Financial Report To Division Managers

THE FIRST QUARTER NUMBERS ARE IN...

	Three Months Ending		Six Months Ending	
	MARCH 31, 1988	MARCH 31, 1987	MARCH 31, 1988	MARCH 31, 1987
SALES				
U.S.	**4,657,770**	1,223,138	8,766,900	2,185,070
Europe	**3,726,216**	978,510	7,013,520	1,748,056
Asia	**931,553**	244,627	1,753,380	437,014
Net Sales	***9,315,539***	***2,446,275***	***17,533,800***	***4,370,140***
OPERATING EXPENSES				
Cost of sales	2,081,761	201,003	3,823,581	363,980
Selling, general and administrative	3,644,439	971,806	6,959,683	1,690,362
Research and development	465,495	148,153	896,671	262,891
Income from operations	3,123,844	1,125,313	5,853,865	2,052,907
Equity in loss of K.C. operations	(158,915)		(218,134)	
Interest income	73,473	53,578	108,171	62,413
Income before federal income taxes	3,038,402	1,178,891	5,743,902	2,115,320
Provision for federal income taxes	1,135,000	511,000	2,175,000	911,000
Net income	***1,903,402***	***667,891***	***3,568,902***	***1,204,320***
Net income per share of common stock	***$0.17***	***$0.06***	***$0.31***	***$0.11***

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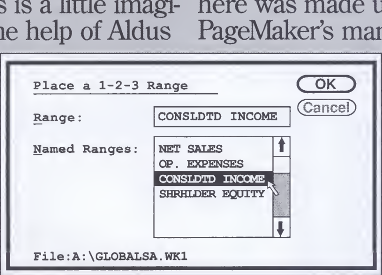

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CIRCLE 117 ON READER SERVICE CARD

FORECASTING

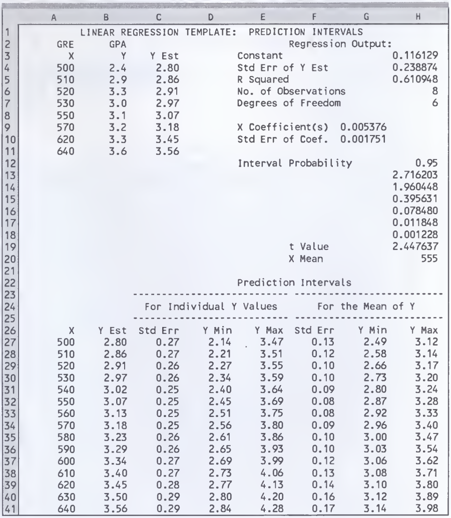
PREDICTION INTERVALS FOR REGRESSION MODELS

Use this spreadsheet model to determine the upper and lower boundaries of predicted data.

BY EVERETTE S. GARDNER JR.

Most business decisions depend on some kind of forecast. Since a decision based on an uncertain forecast is risky, it follows that a forecast is more valuable when there is some estimate of the likelihood that it is correct.

The best way to make such an estimate is to compute a prediction interval, which is a range of possible values around the forecast. In statistics this is known as a confidence interval. The endpoints of the range depend on the probability that future data will fall within the range. Suppose, for example, that a sales forecast for next year predicts that 50,000 units will be sold, with a 95% prediction interval for 40,000 to 60,000 units. Such a forecast indicates a 95% probability that sales will fall between 40,000 and 60,000 units. In general, the smaller the prediction interval



```
        A         B         C         D         E         F         G         H
 1            LINEAR REGRESSION TEMPLATE:  PREDICTION INTERVALS
 2      GRE       GPA                                   Regression Output:
 3        X         Y     Y Est            Constant                          0.116129
 4      500       2.4      2.80            Std Err of Y Est                  0.238874
 5      510       2.9      2.86            R Squared                         0.610948
 6      520       3.3      2.91            No. of Observations                      8
 7      530       3.0      2.97            Degrees of Freedom                       6
 8      550       3.1      3.07
 9      570       3.2      3.18            X Coefficient(s)  0.005376
10      620       3.3      3.45            Std Err of Coef.  0.001751
11      640       3.6      3.56
12                                         Interval Probability                  0.95
13                                                                           2.716203
14                                                                           1.960448
15                                                                           0.395631
16                                                                           0.078480
17                                                                           0.011848
18                                                                           0.001228
19                                                         t Value           2.447637
20                                                         X Mean                 555
21
22                                         Prediction Intervals
23                           ------------------------- -------------------------
24                            For Individual Y Values      For the Mean of Y
25                           ------------------------- -------------------------
26        X     Y Est   Std Err     Y Min     Y Max   Std Err     Y Min     Y Max
27      500      2.80      0.27      2.14      3.47      0.13      2.49      3.12
28      510      2.86      0.27      2.21      3.51      0.12      2.58      3.14
29      520      2.91      0.26      2.27      3.55      0.10      2.66      3.17
30      530      2.97      0.26      2.34      3.59      0.10      2.73      3.20
31      540      3.02      0.25      2.40      3.64      0.09      2.80      3.24
32      550      3.07      0.25      2.45      3.69      0.08      2.87      3.28
33      560      3.13      0.25      2.51      3.75      0.08      2.92      3.33
34      570      3.18      0.25      2.56      3.80      0.09      2.96      3.40
35      580      3.23      0.26      2.61      3.86      0.10      3.00      3.47
36      590      3.29      0.26      2.65      3.93      0.10      3.03      3.54
37      600      3.34      0.27      2.69      3.99      0.12      3.06      3.62
38      610      3.40      0.27      2.73      4.06      0.13      3.08      3.71
39      620      3.45      0.28      2.77      4.13      0.14      3.10      3.80
40      630      3.50      0.29      2.80      4.20      0.16      3.12      3.89
41      640      3.56      0.29      2.84      4.28      0.17      3.14      3.98
```

FIGURE 1. This worksheet computes prediction intervals for both individual and mean values of sample grade point averages (GPAs) (range B4..B11) for students, given their Graduate Record Examination (GRE) scores. The width of the intervals (the spread between the *Y Min* and *Y Max* values in columns D, E, G, and H of the prediction-intervals table) is controlled by the probability you enter in cell H12. This probability is used by formulas in range H13..H19 to compute a *t* distribution value, which is used to determine the prediction intervals. As the probability in cell H12 increases, the widths of the intervals expand.

for a given probability, the more reliable the forecast.

Using the following grade point average example, you can learn how to compute prediction intervals for regression models with one independent variable. To create the regression-model spreadsheet, you'll need *1-2-3* Release 2/2.01 or *Symphony* Release 1.2/2 (and *Symphony*'s statistical functions add-in, STAT.APP).

FORECASTING GRADE-POINT AVERAGES

Figure 1 shows a regression model that forecasts the grade point averages (GPAs) of an entering class of graduate students. The independent variable is the Graduate Record Exam score (GRE) of each entering student. Figure 2 shows the relationship between GPAs and GREs graphically. The positions of the boxes represent the GPA and GRE of each student in the sample. The center line represents the estimated GPAs. The outside lines are the 95% prediction intervals. At any point along the X axis, the probability is 95% that a student's GPA will fall between the upper and lower lines. (Note that the graphs are presented for illustration only; we won't discuss the method for producing them.)

The impression one gets from this graph of a regression model seems reasonable. Five of the eight GPAs in the sample lie almost on the regression line. However, the prediction intervals are so wide that the model should be used with great caution. For example, if a student has a GRE score of 600, the best we can do is predict a GPA ranging from 2.7 to 4.0, with a probability of 95%. Furthermore, for GREs above 600, the upper prediction intervals exceed a GPA of 4.0, which is impossible.

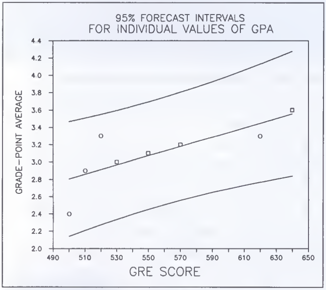


FIGURE 2. The boxes represent GPAs and GRE scores of a sample of students. The center line plots regression estimates of GPAs. This seems to be a reasonable forecasting model because most of the actual data points are near the regression line. The outside lines define 95% prediction intervals for GPAs; that is, the probability is 95% that future values of GPA will fall within the intervals. The width of the prediction intervals is a better indicator of the reliability of the model than the relationship between the boxes and the center line. The intervals are so wide that you must use the model's forecasts with caution.

Smaller prediction intervals are always desirable. There are several ways to reduce intervals. Certainly the most expensive is to gather more data. Additional data usually improves the predictive ability of a forecasting model.

A cheaper way to reduce the intervals is to accept a lower probability that they are correct. For example, 90% prediction intervals are always narrower than 95% intervals. By reducing the probability, you can make the intervals as small as you like. Unscrupulous forecasters often use this trick.

Perhaps the best way to reduce prediction intervals is to take a more realistic approach to forecasting from such a small sample size. Rather than attempt to forecast individual GPAs, you can forecast the mean GPA for all students with a given GRE score. Forecasting the mean is much easier than trying to forecast individual values. In regression modeling, prediction intervals for the mean of the dependent variable are always narrower than intervals for individual values. The top and bottom line in figure 3 demonstrate this.

BUILDING A WORKSHEET FOR PREDICTION INTERVALS

Start with a new worksheet and set recalculation to manual: In *1-2-3* press slash and select Worksheet Global Recalculation Manual. In *Symphony* press MENU and select Settings Recalculation Method Manual Quit. Enter all the labels shown except for those in range E2..F10. Begin the label in cell C24 with two spaces, and begin the label in cell F24 with five spaces. Right-align the labels in ranges A2..C3 and A26..H26: Select /Range Labels Right (in *Symphony*, MENU Range Label-Alignment Right), then specify the desired range. Enter backslash hyphen (\−) in cell C23 and copy cell C23 to range D23..H23. Replace the entry in cell E23 with a label composed of eight hyphens, then copy range C23..H23 to cell C25. Enter the values shown in range A4..B11, then assign the Fixed format with one decimal place to the GPA values: Select /Range Format Fixed (in *Symphony*, MENU Format Fixed), enter *1*, and specify range B4..B11. Assign the name *xvals* to the range of GRE scores: Press slash (in *Symphony*, MENU), select Range Name Create, enter *xvals*, and specify range A4..A11.

If you use *Symphony*, you must now attach the statistical add-in to your worksheet. (If you use *1-2-3*, skip to the next paragraph.) Select SERVICES Applications Attach, select STAT.APP from the menu, then select Quit. This operation adds two new options to *Symphony*'s Range menu: Regres and Matrix.

Select /Data Regression (in *Symphony*, MENU Range Regres), then select X-Range, specify range A4..A11, select Y-Range, specify range B4..B11, select Output-

FORECASTING *continued from page 51*

Range, specify cell E2, then select Go. Range E2..H10 on your screen should now resemble the same range of figure 1.

Now compute the estimated Y for each value of X. In cell C4 enter the following formula:

+$H$3+$G$9*A4

Assign the Fixed format with two decimal places to cell C4, then copy cell C4 to range C5..C11.

The next step is to compute some intermediate values that will be used as arguments in formulas in the Prediction Intervals section. In cell H12 enter the value .95. This is the probability you've chosen for your prediction intervals. The formulas in range H13..H19 convert this probability to the corresponding value from the *t* distribution table. Enter the following formulas:

Cell	**Formula**
H13	@SQRT(@LN(1/((1−H12)*.5)^2))
H14	+H13−((2.30753+0.27061*H13)/ (1+0.99229*H13+0.04481*H13^2))
H15	((1/4)*(H14^3+H14))/H7
H16	((1/96)*(5*H14^5+16*H14^3+3* H14))/H7^2
H17	((1/384)*(3*H14^7+19*H14^5+17* H14^3−15*H14))/H7^3
H18	((1/92160)*(79*H14^9+776*H14^7+1482* H14^5−1920*H14^3−945*H14))/H7^4
H19	@SUM(H14..H18)

The formulas in cells H13..H18 are intermediate steps in the process of converting the probability in cell H12 to its corresponding *t* distribution value in cell H19; their individual results have no significance. These formulas save you the trouble of looking up the *t* value in the tables provided in statistics texts. Note that some of the formulas refer to cell H7, the degrees-of-freedom value created by the regression operation. When using either 0.90 or 0.95, the two most commonly used prediction probabilities, and with at least six degrees of freedom, the formula in cell H19 returns values that match standard *t*-table values to at least two decimal places.

One other intermediate result is needed: the mean of the X values. In cell H20 enter the formula @AVG (*xvals*).

You are now ready to compute the prediction intervals. Place the X values in range A27..A41: Select /Data Fill (in *Symphony*, MENU Range Fill) and specify range A27..A41. Enter *500* as the Start value, *10* as the Step value, and press Return to accept the default Stop value. Enter the following formulas:

Cell	**Formula**
B27	+$H$3+$G$9*A27
C27	+$H$4*@SQRT(1+1/$H$6+((A27− $H$20)^2)/($H$6*@VAR($xvals)))
D27	+$B27−$H$19*C27
E27	+$B27+$H$19*C27
F27	+$H$4*@SQRT(1/$H$6+((A27−$H$20) ^2)/($H$6*@VAR($xvals)))

Copy range D27..E27 to cell G27, then copy range B27..H27 to range B28..B41. Finally, assign the Fixed format with two decimal places to range B27..H41.

INTERPRETING THE FORMULAS

Here's a review of the values in the Prediction Intervals table. Column A contains independent variable, or X, values. Here, they represent GRE scores with the same high and low values as the sample of students but at regular intervals of 10 points. Column B contains the computed Y-estimate values for each X value. Columns C and F contain the standard error values, which measure the variability of the actual Y values from the estimated Y values. Notice that these values differ according to the value of X. To understand why this is so, remember that the regression line (the center line in figure 2) represents the average relationship between X and Y. This relationship is most accurate near the mean of X. The smallest standard errors are in rows 32 and 33, because the X values in those rows are closest to the mean of the actual X values, 555. As you move away from the mean in either direction, the standard errors increase.

The standard errors for predicting individual Y values (column C) are always larger than the standard errors for predicting the mean of Y (column F). As you should expect, predicting the GPA for an individ-

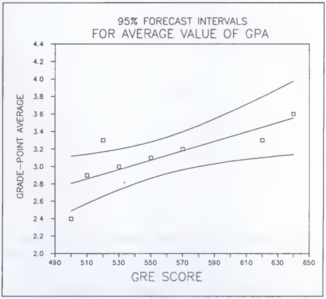


FIGURE 3. This graph is similar to the one in figure 2, except that the top and bottom lines are based on predictions of average GPAs. Note that the lines are much closer together, indicating that the average GPAs are likely to fall into a smaller range.

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ual student involves more variability than predicting an average for many students.

The formulas in columns D and E return the minimum and maximum forecasts, or end points, of the prediction intervals for individual Y values. Columns G and H return the end points of the prediction intervals for the mean of Y values. These are the important columns in the table. They tell you what range you can predict, with a given amount of confidence, that a student's GPA will fall into, given the student's GRE. For example, by looking at cells D31 and E31 you can say, "There is a 95% probability that a student who has a GRE score of 540 will have a GPA of between 2.40 and 3.64." (The values in columns D and E were used to plot the top and bottom graph lines in figure 2.)

> A CHEAPER WAY TO REDUCE PREDICTION INTERVALS IS TO ACCEPT A LOWER PROBABILITY OF CORRECTNESS.

On the other hand, looking at cells G31 and H31, you can say, "For students with a GRE score of 540, there is a 95% probability that the average GPA will be between 2.80 and 3.24." (The values in these columns were used to plot the top and bottom lines in figure 3.)

ADAPTING THE WORKSHEET

You can use this template to determine prediction intervals for your own data. First replace the labels in cells A2 and B2 with words that pertain to your data. Replace the entries in range A4..B11 with your sample values. If you have more than 20 observations in your sample, add spreadsheet rows between rows 21 and 22. Adjust the size of the range named *xvals* so that it encompasses all your X values.

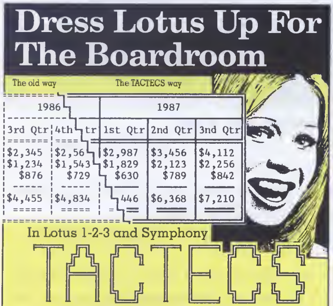
Reissue the Data Regression (in *Symphony*, Range Regres) commands to create a new table of regression values for your X and Y data. Enter a different probability value, if desired, in cell H12. Use the Data Fill (in *Symphony*, Range Fill) commands to create a run of X values in column A of the Prediction Intervals range. Use your lowest X value as the Start value and your highest X value as the Stop value. The Step value is up to you; it depends on the range of the X values and how finely detailed a table you want. Use the Copy command to create additional rows of formulas in columns B through H, or use the Range Erase (in *Symphony*, Erase) command to remove rows of formulas beyond the last X value in column A.

Note that the t value in cell H19 is "two-tailed," so called because it is based on both ends of the t distribution curve. This is appropriate because you've predicted that for a given GRE score, the GPA is likely to be above one value and below another value. In this example, the overall probability inside the interval is 95%. (The probability above $t = 2.447$ and the probability below $t = -2.447$ are both 2.5%.) In some situations, there is a floor below which observations can never vary (usually 0). In such a case, you'll need to use a one-tailed t value. For a one-tailed prediction, edit cell H13 to read:

```
@SQRT(@LN(1/(1−H12)^2))
```

The model we've looked at uses only one independent (X) variable. The procedure for determining prediction intervals with multiple independent variables is more complex. In fact, there are many dedicated statistics programs on the market that don't supply prediction intervals for multiple-regression models. If you manage to develop a *1-2-3* or *Symphony* worksheet that performs this task, please let us know. ■

Everette S. Gardner Jr. is associate professor of decision and information sciences at the University of Houston and associate editor of the International Journal of Forecasting.



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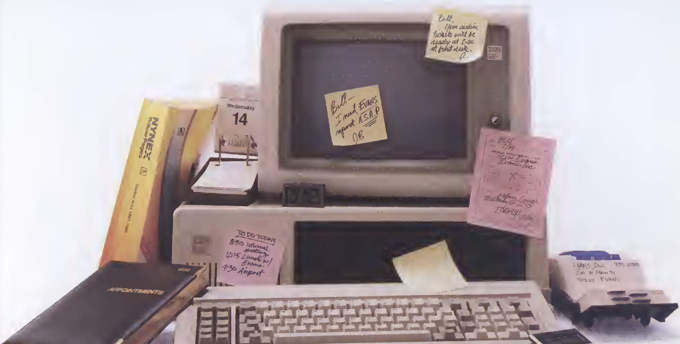

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A BEGINNER'S GUIDE TO GLOBAL SETTINGS

Why let *1-2-3* dictate default global settings? Launch an initiative and change them.

BY PETER G. AITKEN

Global settings—the term sounds rather dramatic. You picture prime ministers and secretaries of state gathering for important meetings at the United Nations or peace envoys shuttling around the world. The effect of global settings in *1-2-3* is not quite as far-reaching as that, but to a *1-2-3* user, global settings are important.

You see the effects of global commands every time you summon a blank worksheet to your screen. These are the settings that dictate, for example, that the column width is 9 or that numbers automatically appear in the General format. Every global command shown in the second row of the chart has a preset default setting, which you can change by issuing the Worksheet Global command. (Note that selections for Time, Hidden, and Name, as well as the settings under Other, are not available in *1-2-3* Release 1A.) Once you change a global setting, it is saved and retrieved along with the worksheet.

To help further define global settings, think of the worksheet commands as falling into two classes: local and global. On the local level, you might change the width of column A to 12, right-align the labels in row 3, or format range C10..E50 for currency. On the global level, you might specify that every column have a width of 12, that every label you enter be right-aligned, or that every number you enter appear in a currency format. Just as the name implies, global commands affect the entire worksheet, whereas local commands affect only part of a worksheet.

Global commands themselves fall into two classes: those that affect an individual worksheet and those that affect *1-2-3* as a whole. The settings found under the menu selection Default constitute the second class of global settings. They dictate, for example, which disk drive *1-2-3* looks in when you issue the File Retrieve command and what kind of international date and time format choices appear on the Format menu. We'll take a brief look at these commands toward the end of this article.

For now, consider the global settings that affect an individual worksheet: format, label-prefix, column-width, recalculation, protection, and zero (zero-suppression) settings. These are the settings you will most often want to adjust. By properly using global settings, you'll save time when you create spreadsheets, as well as improve the appearance and performance of your models.

FORMAT

You can greatly improve the readability of a worksheet by selecting appropriate numeric formats for your data. *1-2-3* offers several styles, or formats, for the display of numbers. A cell's numeric format determines, for example, whether a currency symbol ap-

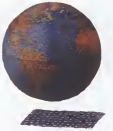
---

Peter G. Aitken wrote about formatting choices in the March issue of LOTUS.

DAVID LESH

pears before the number and how many (if any) decimal places are displayed.

JUST AS THE NAME IMPLIES, GLOBAL SETTINGS AFFECT THE ENTIRE WORKSHEET.



Every worksheet has a global format that *1-2-3* automatically assigns to all cells. The preset default format is General, which suppresses trailing zeros (the number 12.500 would appear as 12.5), displays leading zeros (such as 0.45), and converts very large and very small numbers into scientific notation.

For some worksheets, you might specify a global format that's appropriate for a majority of the cells. Suppose you're working on a large accounting model containing many dollar amounts. You'll improve the appearance of the model and save time by specifying a global currency format. To change the global format, select /Worksheet Global Format. *1-2-3* displays a list of format choices. Highlight your selection and press Return. All worksheet cells whose format you have not previously set with the Range Format command will now carry the new global format. To restore a previously formatted range to the new global format, select /Range Format Reset.

Remember that all worksheet cells, even those containing a label or macro statement, have a numeric format. The format goes into effect only when the cell contains a number. (For a complete description of your formatting options, see "Lives of a Spreadsheet Cell" in the March issue.)

LABEL PREFIX

Every label in a *1-2-3* worksheet has a prefix. To see this for yourself, move the cell pointer to a cell containing a label and look at the control panel. The first character in the label—an apostrophe ('), quotation mark ("), or caret (^)—is the prefix. The label prefix determines the label's alignment in the cell. The apostrophe left-aligns the label, the quotation mark right-aligns the label, and the caret centers the label.

There are three ways to give a label its prefix. The first way is to type in the prefix before you type the label. You must do this when you enter labels that begin with a nonletter character that *1-2-3* might interpret as the beginning of a formula or a value. The second way is to let *1-2-3* assign the global default label prefix to a label. *1-2-3* will automatically supply the global label prefix to any label that begins with a letter. The third method is to change the label prefix of an existing label by selecting /Range Label and choosing an alignment option.

The preset default label prefix is the left-aligning apostrophe. To change it to the right-aligning or centering prefix, select /Worksheet Global Label-Prefix and specify your choice. Changing the global label prefix affects only labels you enter after the change; labels already entered in the worksheet will not change.

Remember, the label prefix affects the placement of the label. Therefore, it follows that the prefix has an effect only if the label is narrower than the column width—in other words, if the cell contains enough space to left- or right-align or to center the label. If the label and the column are the same width, the label fills the entire cell. If the label is wider than the column and if the cell to the right is empty, the label will spill over into it. If the cell to the right is not empty, the label will appear truncated.

COLUMN WIDTH

Some data entries are wider than others. In order to accommodate worksheet entries of different sizes, *1-2-3* lets you set worksheet columns to widths ranging from 1 to 240 spaces.

To modify the width of columns on the local level, you use the Worksheet Column Set-Width command. To change the global column width from its initial setting of 9, you use the Worksheet Global Column-Width command. After you select this command, the current global width appears. You change it by entering a new value between 1 and 240 or by manually adjusting it upward or downward one space at a time by using the right or left Arrow keys. If you use the latter method, changes in width are reflected in the worksheet as you make each single space adjustment. Changing the global column width affects all columns whose width you have not previously altered using the /Worksheet Column Set-Width command. To reset the width of an individual column to the global value, select /Worksheet Column Reset-Width.

RECALCULATION

The global recalculation settings determine how and when *1-2-3* recalculates the worksheet. There are three aspects of worksheet recalculation to consider.

First, consider whether worksheet recalculation should be performed automatically or manually. The preset default setting is for automatic recalculation, so *1-2-3* recalculates every cell in the worksheet every time you make an entry, whether or not the entry affects the formulas. Because all worksheet calculations are kept up to date, this is the safest recalculation method. If your worksheet contains many formulas, however, each recalculation can take a significant amount of time—from one or two seconds to several minutes or longer, depending on the number and complexity of the formulas.

Pauses for recalculation during data entry can be annoying. To avoid unnecessary recalculations, set global recalculation to Manual; then you can decide when *1-2-3* should recalculate the worksheet. You can enter data and make other changes to the worksheet without pauses for recalculation and then press the CALC key to update the worksheet. If recalculation is set to Manual and you make a change to the worksheet, the *Calc* indicator appears at the bottom of the screen. This indicator reminds you that changes you've made to the worksheet may affect the calculated results of your formulas and, therefore, that you should press CALC before interpreting or printing the worksheet.

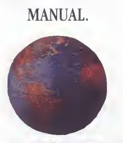
Second, consider the order in which *1-2-3* recalculates formulas. There are three options here. The default setting, Natural, recalculates formulas in the order in which they depend on each other. Suppose your worksheet contains these values and formulas:

Cell	**Contents**
A1	+B2*.07
B2	+C3+25
C3	+D4*2
D4	1500

Cell A1 depends on cell B2, cell B2 depends on cell C3, and cell C3 depends on cell D4. Using automatic natural-order recalculation, *1-2-3* calculates cell C3 first, then cell B2, and then cell A1. This recalculation order is necessary to obtain the correct result, 211.75, in cell A1.

The other two recalculation options are Columnwise and Rowwise. If you select either of these, *1-2-3* starts in cell A1 and recalculates the worksheet in a linear fashion, column by column or row by row, without paying any attention to dependencies among formulas. Recalculation by row or column provides accurate results if your worksheet does not contain any forward references (formulas that reference cells to the right or below them in the worksheet). If your worksheet contains forward references, stick with natural-order recalculation or your formulas may give inaccurate results. For example, specify Columnwise recalculation and then work out the example presented above. You'll find that if you change the contents of cell D4 to 1000, *1-2-3* needs to recalculate the worksheet three times before cell A1 produces a result that correctly reflects the change in cell D4. The worksheet calculates once when you enter the value 1000. Then you must force recalculation by pressing the CALC key twice. Finally, cell A1 calculates the correct result, 141.75.

AVOID UNNECESSARY WORKSHEET RECALCULATION BY SETTING GLOBAL RECALCULATION TO MANUAL.



In a worksheet containing no forward references, recalculation by row or column is slightly faster than natural-order recalculation because *1-2-3* does not have to check the dependencies between formulas in order to determine the "proper" recalculation order. Unless you have a specific reason for changing recalculation order, your best and safest bet is to leave it set at Natural.

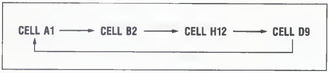
Specifying iterations, or the number of times *1-2-3* recalculates the worksheet each time you press CALC (or if recalculation is set to Automatic, each time you make an entry), is the final option to consider. The default number of iterations is 1, but you can specify up to 50. You can test this by leaving recalculation set to Columnwise and changing iterations to 3. Then enter the value 1500 in cell D4; cell A1 automatically calculates the correct result, 211.75.

You may need to recalculate a worksheet more than once for two reasons. First, if your worksheet contains forward references and you specify Rowwise or Columnwise recalculation, you'll want to specify a sufficient number of iterations so that the worksheet is recalculated enough times to resolve all forward references. (Note that recalculation of models containing forward references is usually faster if you choose Natural and specify iterations.)

Second, you may have intentionally structured your formulas to contain a circular reference. A circular reference exists when the result of a formula depends on itself—in other words, when a formula includes its own result in its calculation. The most obvious case is when a cell contains a formula that directly references that same cell—for example, if cell C4 contains the formula +A1/C4. Less obvious circular references often consist of long chains of formulas. Suppose you've set your worksheet for automatic, natural-order recalculation and specified one iteration and your worksheet contains these formulas:

Cell	**Formula**
A1	+B2*.75
B2	+H12−100
H12	−D9/0.95
D9	+A1*2

The value in each cell ultimately depends upon itself because the dependencies between cells form the closed loop that is illustrated on the next page:



This chain is four formulas long, but even longer circular-reference chains are possible. Whenever *1-2-3* detects a circular reference, the *Circ* indicator appears at the bottom of the screen.

Many circular references, including the obvious kind in which a cell's formula directly references the cell, are unsolvable and meaningless; you must locate and remove them from your worksheet. In cases where you intentionally use circular references, the accuracy of the final result depends on the number of times the circular chain is recalculated. You control the number of times a worksheet recalculates by specifying a number of iterations.

If the recalculation order is set to Natural and the worksheet contains no circular references, a single recalculation is always sufficient. Under these circumstances, *1-2-3* ignores the Iterations setting and performs just one recalculation. (For more on worksheet recalculation, see "Your Basic Recalculation Options" in the November 1987 issue.)

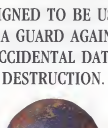
PROTECTION

Have you ever erased a range or deleted a column only to discover that you have obliterated a block of important data, complex formulas, or involved macro statements? Or perhaps you developed a complex financial-forecasting worksheet for use by your coworkers and later found that they meddled with your carefully planned model. If the mere thought of such disasters makes you shudder, consider worksheet protection.

When you protect a worksheet, no one can accidentally erase, edit, write over, or change the contents in any way. When the cell pointer is on a protected cell, the cell's contents appear in the control panel along with the letters PR to indicate that it's a protected cell. To use protection effectively, consider the two levels at which it works.

Each cell has a protection flag that can be either on or off. The default is that protection is on for all cells. You can turn the protection flag off for a cell or range of cells by using the Range Unprotect command. To turn protection back on, you use the Range Protect command. Cells whose protection flag is off appear on the screen in a different color or intensity.

USE WORKSHEET PROTECTION AS IT WAS DESIGNED TO BE USED: AS A GUARD AGAINST ACCIDENTAL DATA DESTRUCTION.



Turning a cell's protection flag on is not in itself enough to protect the cell. The actual effect of the protection flag is determined by the /Worksheet Global Protection command. If protection is disabled (the default setting), the protection flags have no effect and all cells in the worksheet are unprotected. If you enable protection by using the Worksheet Global Protection Enable command, all cells whose protection flag is on become protected.

This two-level protection scheme may seem cumbersome, but it's actually convenient. After designing your worksheet, use the Range Unprotect and Range Protect commands to set the protection flags as needed for individual cells and ranges. For example, unprotect data-entry cells, protect cells containing macro code and formulas, and so on. Then enable or disable global protection, depending on whether you are modifying or debugging the worksheet, running its application, or passing it along to coworkers.

Worksheet protection cannot guard against willful tampering. Because no password is required, anyone can disable protection and get at your protected cells. Use worksheet protection as it was designed to be used: as a guard against accidental data destruction.

ZERO

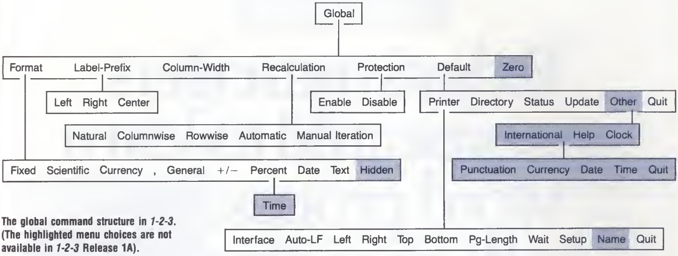
Some worksheets contain many cells that display unnecessary, distracting zeros. This global setting, which might better be called zero suppression, suppresses the display of zeros when set to Yes. The default setting, No, allows the display of zeros. Zero display applies to all zero values, whether you enter them as numbers or whether they are the result of formulas or functions.

A danger exists when zero suppression is turned on. Since cells containing zeros appear to be empty, you may inadvertently overwrite them. To prevent this, you might want to use the Range Protect and Worksheet Global Protection Enable commands to safeguard the cells.

Unlike other global settings, suppression of zero display is not saved with the worksheet. When you retrieve a worksheet file, zero suppression is turned off even if it was on when you saved the worksheet. This characteristic is a safety device that reminds you of all the zero cells in a worksheet that you may not have seen in a while. Once you retrieve the worksheet, you can turn zero suppression on again.

DEFAULT

This menu selection is somewhat misleading. All global settings, not just those listed under Default, have preset default settings that are


Global
Format
Label-Prefix
Column-Width
Recalculation
Protection
Default
Zero
Left Right Center
Enable Disable
Printer Directory Status Update Other Quit
Natural Columnwise Rowwise Automatic Manual Iteration
International Help Clock
Fixed Scientific Currency , General +/– Percent Date Text Hidden
Punctuation Currency Date Time Quit
Time
Interface Auto-LF Left Right Top Bottom Pg-Length Wait Setup Name Quit

The global command structure in *1-2-3*. (The highlighted menu choices are not available in *1-2-3* Release 1A).

in force until you change them. However, the settings grouped under Default are together for a reason. All of the global settings discussed so far—Format through Zero—apply to individual worksheets. Settings grouped under Default—Printer, Directory, Status, Update, and Other—apply to *1-2-3* itself.

PRINTER

The Printer menu selection presents you with a submenu that you use to configure your printer. Because these settings depend on the type of printer you use, we'll take only a brief look at them. For the most part, you'll never need to change the default settings, but it is worth knowing that these settings exist.

The submenu choices are Interface, Auto-LF, Left, Right, Top, Bottom, Pg-Length, Wait, Setup, and Name. Interface allows you to configure the physical connection between your computer and printer. Auto-LF controls the signal that *1-2-3* sends to your printer at the end of each line of output. Left, Right, Top, and Bottom are settings that control the margins or the amount of space between the printed output and the edges of the paper. Pg-Length tells *1-2-3* the length, in lines, of each page. Wait determines whether *1-2-3* pauses between pages to allow you to insert a fresh sheet of paper in your printer (a task that is necessary if you don't use continuous-feed paper). Setup allows you to specify a setup string that *1-2-3* sends to your printer at the start of each print job. Name is applicable only if you selected more than one text printer when you installed *1-2-3*. When you select Name, *1-2-3* displays a list of the printers that are installed.

DIRECTORY

The Directory option lets you specify the default directory—that is, the disk and directory from which *1-2-3* retrieves files and to which *1-2-3* saves files. The default setting is A:\. To change this, select /Worksheet Global Default Directory and press the Escape or Backspace key to erase the old setting. Then enter the new default drive and directory—for example, *c:\myfiles*.

STATUS

The status menu selection displays the current status of all the Global Default settings. These include Printer, Directory, and Other settings. (To see a similar display for recalculation, circular reference, cell display, and protection, select /Worksheet Status.)

UPDATE

When you change any of the settings listed on the Global Default submenu, you should decide whether you want the changes to affect only the current session or to affect all future sessions. If you choose the former, you need do nothing. However, if you choose the latter, you select Update from the menu, and *1-2-3* saves your changes in a disk file named 123.CNF. The next time you start *1-2-3*, the program reads the settings from this file and puts them into effect.

OTHER

Selecting Other takes you to a submenu that allows you to change the method of on-screen help, the display of an on-screen clock, and the international formats for punctuation, currency, date, and time. For example, under International, you might specify the currency symbol and indicate whether to place it before or after the number. You can use any symbol in the Lotus International Character Set, which includes the yen, the pound, the peseta, and more.

This concludes our tour of *1-2-3*'s global settings. Because the default settings are the best choices in the majority of situations, you may never need to change any of them. However, by knowing where these settings are and how to use them, you may be able to improve the appearance of your models and save yourself some time along the way. ■

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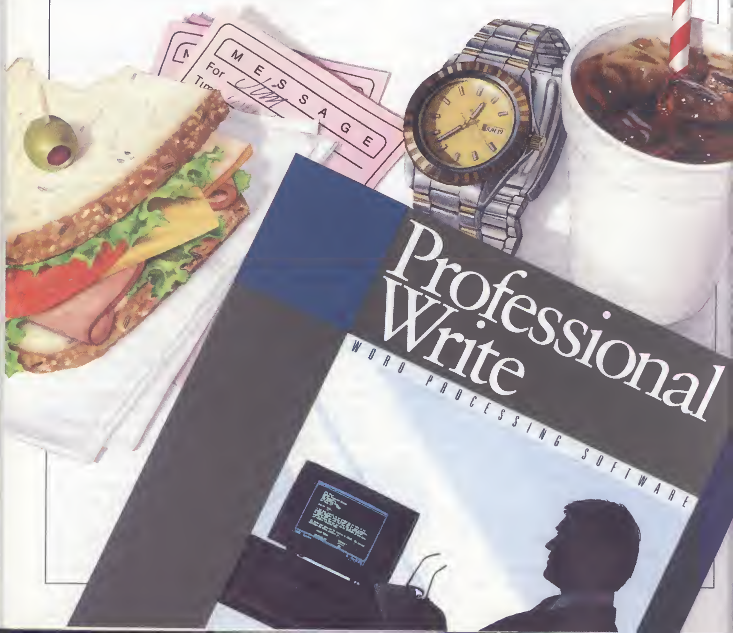

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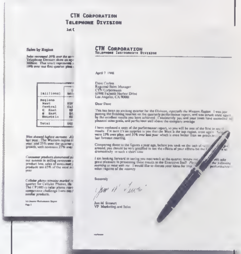

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Four 1-2-3 Database Add-Ins

If you have to twist and shout to get *1-2-3* to meet your database needs, give some airplay to this quartet of new products.

BY MALCOLM JOHNSTONE

In recent months, several database add-in products have become available for *1-2-3* Release 2/2.01. These products enhance and expand *1-2-3*'s database features by handling much greater quantities of data and performing more sophisticated database operations than are possible with *1-2-3*'s Data Query commands.

To introduce you to these products, we'll examine four of them: *@Base, Informix Datasheet Add-In, Oracle Database Add-In for Lotus 1-2-3*, and *Silverado*. We won't be judging the merits and shortcomings of these products (some have already been reviewed in *LOTUS*). Rather, we'll discuss what the products can do and look at their operating requirements.

These database add-ins offer two main advantages over using *1-2-3* by itself. The first is their ability to create disk-based databases, letting you work with

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JAVIER ROMERO

much larger databases. The second advantage is that they allow relational operations that can link two or more databases.

Database add-ins also offer a couple of advantages over stand-alone database products such as *dBase III*: They use a menu structure similar to *1-2-3*'s, allowing *1-2-3* veterans to learn these products quickly, and they can be used in conjunction with *1-2-3* macros.

HOW THEY HANDLE DATA

The database add-ins let you work with very large databases. In most cases, only the available space on your hard disk limits the size of the database. This means that your databases can easily be several megabytes in size and include tens of thousands of records. (By contrast, a spreadsheet-based database cannot contain more than 8,191 records, regardless of the amount of available memory.) These products accomplish this by keeping all of your database records on disk, moving only selected records (for example, when you perform a query) into the worksheet. Any changes to the records are written to the disk during your *1-2-3* session. You don't have to worry about running out of memory as your database grows.

A relational database is a combination of two or more smaller databases, sometimes called tables, which are treated as one. You can query or create reports from the connected tables, using the information from all of them. To better understand relational databases, let's consider a simple example.

The database at the top of figure 1 is used by Search-the-Globe Car Finders, which locates cars for specialty dealers. The client database is the master listing of Search-the-Globe's client dealers and contains the account number, contact person, company

```
Clients
-------------------------------------------
AcctNum Name        Company          Phone#
-------------------------------------------
   3425 Jim Burns   Dizzy Motors     237-9231
   3426 Ed Silver   Remulus & Romus  235-8976
   3489 Kim Kelly   Flat Tire Unltd  431-3425
   3514 Sue Welch   The V8 Chariot   643-8976
   3411 Tom Sanchez Skwayr Wheels    438-1191

Requests
------------------------------
AcctNum Request     MaxPrice
------------------------------
   3489 Jaguar XJS   $42,000
   3489 Rolls SS     $95,000
   3411 Jaguar XJS   $40,500

Clients Requesting Jaguar XJS
-----------------------------------------------------
AcctNum Name        Company          Phone#   MaxPrice
-----------------------------------------------------
   3489 Kim Kelly   Flat Tire Unltd  431-3425 $42,000
   3411 Tom Sanchez Skwayr Wheels    438-1191 $40,500
```

FIGURE 1. This demonstrates how two databases can be linked together by a common field (in this case, *AcctNum*). The report at the bottom is the result of a search made in both databases, which is a relational-database technique.

name, and phone number for each client. This database rarely needs to be updated.

When Search-the-Globe receives a request, it enters the client's account number, the car requested, and the price the client is willing to pay into the Requests table (found in the second section of the figure). Only the account number is used to identify a client in this database. Notice that the client with account number 3489 has submitted two requests. This sample database has only a few records, but if it were many times larger and each client's contact person, company name, and phone number were listed in the Requests table, the redundancy would increase data-entry requirements, slow down processing, and increase storage requirements. Instead, the account number links the Requests table to the Client database.

One day, Search-the-Globe gets a lead on a Jaguar XJS and performs a search for clients who have requested that car, the result of which appears at the bottom of the figure. Notice that the database program has pulled information out of *both* tables. Each time it found the words *Jaguar XJS* in the Requests table, it looked up the account number and the client's maximum price and then searched for the contact person, company name, and phone number from the Client database.

A few of the *1-2-3* database add-ins provide an indexing feature that speeds up relational operations. You simply assign an index number to each database record and the software uses these numbers as pointers. Indexing is only advantageous when working with large databases. Using an index with a small database can actually slow things down, since maintaining one requires more time than actually performing database operations.

@Base and *Silverado* include database @functions that return values based on the contents of database files on a disk. These functions, like *1-2-3*'s @functions, can be used by themselves or as part of larger formulas. There are logical, date, and statistical functions. To realize their usefulness, consider the statistical functions, which can search a database on your disk and bring a resulting value into a cell in your *1-2-3* worksheet. For example, the @DBSUM function of *Silverado*, demonstrated in the following formula, examines a database named *sales* and returns the sum of all values in the *Amount* field for records with *NY* in the *State* field:

```
@DBSUM(“sales”,“amount”,“state = “NY””)
```

MACRO SUPPORT

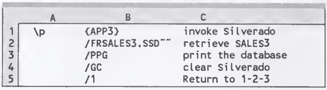
To use a *1-2-3* add-in, you must copy its files onto your computer's hard disk. You must also add the Add-In Manager to *1-2-3*'s driver-set file. Some of the add-ins come with setup programs that handle this for you. This adds new key combinations to your *1-2-3* sessions. On most systems, for example, holding down the Alt key and pressing F10 lets you attach, detach, or invoke an add-in. When you attach an add-in, you can assign it to one of three key combinations (on most systems Alt-F7, Alt-F8, or Alt-F9) in order to invoke the add-in directly.

Installing the Add-In Manager adds four *1-2-3* macro keywords so that the new key combinations can be "pressed" by a macro. The keywords {APP1}, {APP2}, {APP3}, and {APP4} correspond to Alt-F7 through Alt-F10 on most systems. The Add-In Manager also adds a new @function, @ISAPP. The formula @ISAPP("*application name*") returns 1 if the specified application is attached; otherwise, it returns 0. You can use this function to prevent a macro from executing invalid keystrokes. For example, a macro might begin with the instruction:

```
{IF @ISAPP(“oracle”)=0}{QUIT}
```

This would stop the macro if the *Oracle* add-in were not attached.

Macro control of a database add-in lets you automate such routine tasks as record selection, reporting, and graphical analysis. The macro at the top of the next page will work if *Silverado* is attached and assigned to application key 3 (Alt-F9 on most systems). It retrieves and prints the Sales database whenever you hold the MACRO key (Alt on most computers) and press P.



	A	B	C
1	\p	{APP3}	invoke Silverado
2		/FRSALES3.SSD~~	retrieve SALES3
3		/PPG	print the database
4		/GC	clear Silverado
5		/1	Return to 1-2-3

Although you don't *need* to use macros to work with the database add-ins, it's worth the time it takes to automate some of the add-in tasks.

USING THE PRODUCTS

In this section, we'll look briefly at what it's like to work with these products. (For a more detailed look at *Informix Datasheet Add-In*, see the review in the February issue of *LOTUS*. For more on *@Base*, see the review in the April issue.)

Oracle Database Add-In for Lotus 1-2-3 is perhaps the most powerful of the database add-ins because it is based on SQL (Structured Query Language), a standard protocol on large computer systems that is emerging as a standard for personal-computer database products. SQL lets you define a series of operations, using a structured language much like BASIC or Pascal.

What makes *Oracle* unique is that it lets you perform Query, Sort, and other operations from menu selections, then it stores the instructions in a single cell as a special @function in your *1-2-3* worksheet. You don't need to learn SQL to use the add-in, but with some knowledge of SQL, you can modify and run the SQL code stored in your worksheet.

Oracle uses the *1-2-3* worksheet for most of its operations. To query a database, selecting only specified records, invoke the add-in and select Input, then specify the database and the columns within the database to be queried. (The add-in displays the database and column names when you press the HELP key.) If you specify two or more databases, *Oracle* asks for a common field with which to join the databases. Then you create an Output range in the *1-2-3* worksheet by highlighting a range. You can also specify record-selection criteria or apply an unlimited number of sorts by answering menu prompts.

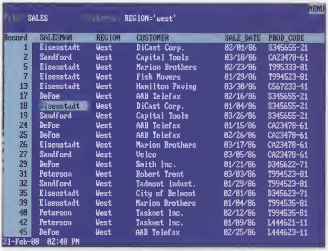
Oracle Corp. sells database products for mainframes, minicomputers, and PCs, all of which can share database files with *Oracle Database Add-In for Lotus 1-2-3*. The program also offers security features, including both user-name and password protection.

Informix Datasheet Add-In also has its origins in database products designed for mainframes and minicomputers. *Datasheet Add-In* files can be shared with Informix database products running on large computers and with Informix's PC product *Informix-SQL*. *Datasheet Add-In* commands closely resemble the *1-2-3* Data Query commands, and *Datasheet* uses the *1-2-3* worksheet to set up all of the ranges used in handling records stored on the disk.

To extract records from an *Informix Datasheet Add-In* database and move them into your worksheet, invoke the add-in and specify an Input range, naming one or more of the databases or tables on the disk. Next specify a Criterion range in your worksheet that contains the column headings and criteria to be used. (You can also place a Sort keyword in the Criterion range, which allows you to sort on as many as eight columns.) *Datasheet Add-In* includes five aggregate functions: Sum, Avg, Max, Min, and Count. You use these in the Criterion range, causing the extract operation to summarize information necessary for reports with subtotals. Finally, define the Output range and perform the extract. *Datasheet* automatically formats the worksheet cells. If the Output range is not large enough, *Datasheet* displays a paging menu that allows you to page through the remaining extracted data. Once you have extracted records from a database, you must return to the *1-2-3* environment to produce reports.

Even though the steps used to perform queries are similar to those used in *1-2-3, Datasheet* includes a 31-page manual called "A Head Start for /DQ Users." *Datasheet* also provides a tutorial, both on disk and in a separate manual, that helps you transfer *1-2-3* databases to *Datasheet* and start using its features.

@Base lets you view a database of up to 32 megabytes through a Browse window that scrolls left, right, up, or down. Figure 2 shows a Browse window. *@Base* retrieves specific data from the disk and transfers it to the window. This viewing method lets you quickly see all of your database records (or those that match criteria) without bringing them into a *1-2-3* worksheet. You can develop database queries, sort databases on an unlimited number of fields, and gen-



SALES REGION='west'

Record	SALESMAN	REGION	CUSTOMER	SALE_DATE	PROD_CODE
1	Eisenstadt	West	DiCast Corp.	02/01/86	S345655-21
2	Sandford	West	Capital Tools	03/18/86	CA23478-61
5	Eisenstadt	West	Marion Brothers	02/23/86	T995333-81
7	Eisenstadt	West	Fisk Movers	01/29/86	T994523-81
13	Eisenstadt	West	Hamilton Paving	03/30/86	C567233-41
17	DeFoe	West	A&B Telefax	02/16/86	S345655-21
18	Eisenstadt	West	DiCast Corp.	01/04/86	S345655-21
19	Sandford	West	Capital Tools	03/26/86	S345655-21
24	DeFoe	West	A&B Telefax	01/15/86	CA23478-61
25	DeFoe	West	A&B Telefax	02/26/86	CA23478-61
26	Eisenstadt	West	Marion Brothers	03/17/86	CA23478-61
27	Sandford	West	Velco	03/05/86	CA23478-61
29	DeFoe	West	Smith Inc.	01/21/86	D345622-71
31	Peterson	West	Robert Trent	03/03/86	T994523-81
32	Sandford	West	Tadmont Indust.	01/29/86	T994523-81
35	Eisenstadt	West	City of Belmont	02/01/86	D345623-71
39	Eisenstadt	West	Marion Brothers	01/04/86	T994535-81
40	Peterson	West	Tasknet Inc.	02/12/86	T994535-81
42	Peterson	West	Tasknet Inc.	01/09/86	L444621-11
45	DeFoe	West	A&B Telefax	02/25/86	L444623-11

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FIGURE 2. The *@Base* Browse window lets you view a disk-based database without bringing data into your worksheet. This window was created by specifying *sales* as the database file and *region='west'* as the criterion.

erate cross-tabulated reports by choosing menu options. To specify criteria for selecting records, you choose field names from one menu and select a search condition from another. You can also use *@Base*'s 18 @functions to get summary values based on the contents of the database on the disk.

For certain relational operations, you must purchase a separate add-in called *Option Pac*. You can use *@Base* without *Option Pac*, but *@Base* alone does not allow joining or indexing.

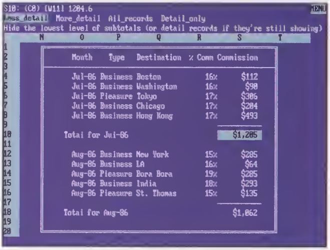
@Base has a Forms window for entering and modifying data. It displays an entire record on the screen, which is handy when editing or entering database information. It can produce cross-tabulated reports directly from the on-disk database. Reports that are not cross-tabulated must be generated by moving selected records into the *1-2-3* worksheet.

@Base is the only one of these products that generates files using the *dBase* format, which means you can share *@Base* files with your colleagues who use *dBase III* and *dBase III Plus*. (*@Base* reads and stores *dBase* DBF files, *Option Pac* reads and stores *dBase* NDX index files.)

@Base's manual gives examples, many involving macros, that explain how to generate and print columnar reports and mailing labels.

Silverado combines disk-based and relational features with reporting options, including cross-tabulated reports, mailing labels, and report outlining. Figure 3 shows a *Silverado* screen with the Report Outliner active. Features include 10 database @functions, the Form View option, menu-prompted queries and sorts, and validity checking as data is entered.

Silverado can view an entire database on disk through a database window in your spreadsheet without bringing records into the *1-2-3* worksheet. You can determine the size of the database window and where it will appear in your worksheet. You perform queries by selecting menu options and specifying the records you wish to view. Select /Search Criteria to specify criteria. You then enter the criteria in the database window underneath the appropriate field name. To join two databases, select /Multi Join; a window containing three rows appears. You enter the name of the main database on the top row and the names of the two databases to be joined on the next two rows.



```
S10: (C0) [W11] 1204.6                                                  MENU
Less_detail  More_detail  All_records  Detail_only
Hide the lowest level of subtotals (or detail records if they're still showing)
          N          O          P          Q          R          S          T
1
2          Month    Type    Destination  % Comm Commission
3
4          Jul-86 Business Boston           16%      $112
5          Jul-86 Business Washington       16%       $98
6          Jul-86 Pleasure Tokyo            17%      $306
7          Jul-86 Business Chicago          17%      $204
8          Jul-86 Business Hong Kong        17%      $493
9
10       Total for Jul-86                          $1,205
11
12         Aug-86 Business New York         15%      $205
13         Aug-86 Business LA               16%       $64
14         Aug-86 Pleasure Bora Bora        19%      $285
15         Aug-86 Business India            18%      $293
16         Aug-86 Pleasure St. Thomas       15%      $135
17
18       Total for Aug-86                          $1,062
19
20
```

FIGURE 3. *Silverado*'s Report Outliner displays database information in varying degrees of detail. Here, travel information is displayed with subtotals by month. Selecting Less_Detail from the *Silverado* menu would cause only the subtotals to show.

Report generation is *Silverado*'s real strength. *Silverado* lets you create cross-tabulated and summary reports from a series of menus. Report formats may then be customized with further menu choices. A unique reporting feature called Database Outlining lets you control the level of detail of your report.

The Form View option lets you work on one record at a time. You can modify the form to suit your needs.

These four database add-ins may operate differently from each other, but they share some important characteristics. They all add to *1-2-3*'s database capabilities. They all include features that let you move a database currently residing in a *1-2-3* spreadsheet into a disk-based file, thereby avoiding having to reenter database information. And they all have menu structures that will seem familiar to *1-2-3* users. ■

IN BRIEF

@Base Version 1.0. Personics Corp., 2352 Main St., Bldg. 2, Concord, MA 01742; 617-897-1575. Runs on the IBM PC, PC XT, PC AT, PS/2, and compatible computers with *1-2-3* Release 2/2.01 and DOS 2.0 or higher. Requires 512K of RAM (*@Base* occupies 76K, plus 8K per open database). Released 11/87. $195. *Option Pac* requires 35K. $89.95. Not copy-protected; 30-day, money-back guarantee; 90-day warranty on disk.

Informix Datasheet Add-In Version 1.0. Informix Software, 4100 Bohannon Dr., Menlo Park, CA 94025; 415-322-4100. Runs on IBM PCs and compatibles with DOS 2.11 or higher. Requires 640K of RAM, a hard disk, and *1-2-3* Release 2/2.01. Released 4/87. $199.95. Not copy-protected; 90-day warranty.

Oracle Database Add-In for Lotus 1-2-3 Version 1.0. Oracle Corp., 20 Davis Dr., Belmont, CA 94002; 800-ORACLE1. Runs on any IBM- or Compaq-compatible 80286 or 80386 system. Requires 640K of RAM, 1 megabyte of extended memory, 5 megabytes of available hard-disk space, DOS Version 3.0 or higher, and *1-2-3* Release 2.01. Released 2/88. $199. Not copy-protected; 90-day warranty on disk; 30-day, money-back guarantee if bought directly from Oracle Corp.

Silverado Version 1.0. Computer Associates International, 1240 McKay Dr., San Jose, CA 95131; 800-531-5236. Runs on IBM PCs and compatibles with DOS 2.0 or higher. Requires 512K of RAM and *1-2-3* Release 2/2.01. Released 1/88. $149. Not copy-protected; 90-day warranty.

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SMALL-BUSINESS SERIES

PART THREE

ACCOUNTS RECEIVABLE

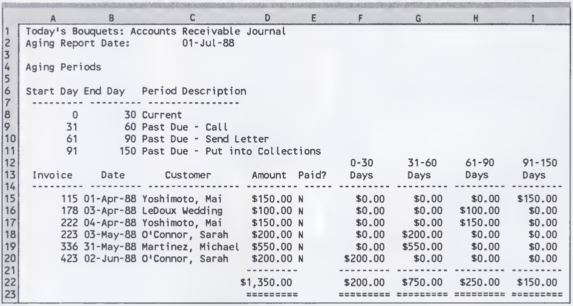
Use this database to track who owes you how much and who's past due.

BY STEPHEN L. NELSON

As the owner of a small business, you may have a great product that is selling well at a good price, but if you don't collect from your customers on time, you're in trouble. Accounts receivable, those amounts your customers owe you, often represents one of your largest liquid assets. An accounts receivable journal that lists and tracks outstanding invoices as they age is a vital monitoring tool that you can use to keep the cash coming in.

To learn how to apply this tool to your business, let's consider how Today's Bouquets, a hypothetical small business that was introduced in the first installment of this series, uses an accounts receivable journal to help keep its cash flow positive. Take a look at the flower shop's journal shown in figure 1. The journal lists, by invoice number, the amounts that customers owe. Generally speaking, an accounts receivable journal includes the customer's name and the

HORNICK/RIVLIN STUDIO



```
        A          B            C               D       E       F         G         H         I
 1  Today's Bouquets: Accounts Receivable Journal
 2  Aging Report Date:        01-Jul-88
 3
 4  Aging Periods
 5
 6  Start Day End Day   Period Description
 7   --------- --------- ---------------
 8          0        30 Current
 9         31        60 Past Due - Call
10         61        90 Past Due - Send Letter
11         91       150 Past Due - Put into Collections
12                                                          0-30      31-60     61-90     91-150
13    Invoice     Date       Customer         Amount  Paid?  Days      Days      Days      Days
14  --------- --------- --------------- --------- -----  --------- --------- --------- ---------
15        115 01-Apr-88 Yoshimoto, Mai    $150.00 N         $0.00     $0.00     $0.00   $150.00
16        178 03-Apr-88 LeDoux Wedding    $100.00 N         $0.00     $0.00   $100.00     $0.00
17        222 04-Apr-88 Yoshimoto, Mai    $150.00 N         $0.00     $0.00   $150.00     $0.00
18        223 03-May-88 O'Connor, Sarah   $200.00 N         $0.00   $200.00     $0.00     $0.00
19        336 31-May-88 Martinez, Michael $550.00 N         $0.00   $550.00     $0.00     $0.00
20        423 02-Jun-88 O'Connor, Sarah   $200.00 N       $200.00     $0.00     $0.00     $0.00
21                                      ---------          --------- --------- --------- ---------
22                                    $1,350.00            $200.00   $750.00   $250.00   $150.00
23                                      =========          ========= ========= ========= =========
```

FIGURE 1. This is the accounts receivable journal and aging report for Today's Bouquets. You enter the current date in cell C2. Then you enter customer invoice information, as shown in rows 15 through 20. Formulas in columns F through I automatically calculate the current aging of your receivables.

invoice number, the amount owed, and the date of the invoice. The aging component of the worksheet, which is shown in range A4..C11, is where you specify time brackets and actions that you'll take as the receivables age. Range F15..I20 contains formulas that determine the bracket in which each outstanding invoice belongs.

The model classifies accounts receivable by age, based on the number of days since the invoice date. A typical business convention is to classify receivables using age groups of 0 to 30 days, 31 to 60 days, 61 to 90 days, and 91 to 150 days. These are the categories that Today's Bouquets uses. The payment terms at the flower shop are net 30, meaning that customers must pay for bouquets 30 days after they take delivery of them. This payment policy determines the first aging bracket: Current accounts are those that are 30 or fewer days old.

As soon as an invoice is 31 days old, it is considered to be past due. Most businesses track invoices through several past-due brackets. As an unpaid invoice moves from one bracket to the next past-due bracket, you, as the business owner, should take action to collect the payment. For example, at Today's Bouquets, you call customers who have unpaid invoices in the 31-to-60-day bracket. In this phone call, you inquire about the past-due amount and verify that the payment isn't overdue because of some mistake. Perhaps you mailed the invoice to the wrong address or perhaps something happened to the customer's order—for example, a bouquet delivered to someone's doorstep may have wilted before the recipient found it so the customer decided not to pay.

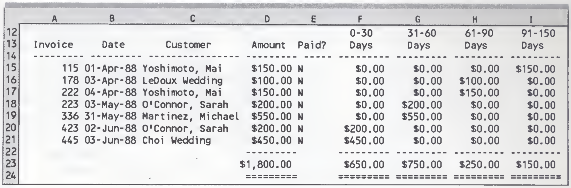
When an invoice moves into the 61-to-90-day bracket, you send a formal collection letter assessing a late-payment penalty and requesting immediate payment.

SETUP TABLE

Cell	**Formula**
C2	@DATE(88,7,1)
B15	@DATE(88,4,1)
B16	@DATE(88,4,3)
B17	@DATE(88,4,4)
B18	@DATE(88,5,3)
B19	@DATE(88,5,31)
B20	@DATE(88,6,2)
F12	+“ ”&@STRING(A8,0)&“-”&@STRING(B8,0)
G12	+“ ”&@STRING(A9,0)&“-”&@STRING(B9,0)
H12	+“ ”&@STRING(A10,0)&“-”&@STRING(B10,0)
I12	+“ ”&@STRING(A11,0)&“-”&@STRING(B11,0)
F15	@IF($C$2-$B$8<=B15,D15,0)
G15	@IF($C$2-$A$9>=$B15#AND#$C$2-$B$9<=$B15,$D15,0)
H15	@IF($C$2-$A$10>=$B15#AND#$C$2-$B$10<=$B15,$D15,0)
I15	@IF($C$2-$A$11>=$B15#AND#$C$2-$B$11<=$B15,$D15,0)
D22	@SUM(D14..D21)

Format	**Range**
Date 1	C2
Date 1	B15..B20
Currency 2	D15..I22

Copy From	**Copy To**
F15..I15	F16..I20
D22	F22..I22



```
       A         B              C              D      E        F         G         H         I
12                                                         0-30     31-60     61-90    91-150
13  Invoice     Date       Customer       Amount  Paid?    Days      Days      Days      Days
14 --------- --------- ---------------- --------- ----- --------- --------- --------- ---------
15       115 01-Apr-88 Yoshimoto, Mai     $150.00 N         $0.00     $0.00     $0.00   $150.00
16       178 03-Apr-88 LeDoux Wedding     $100.00 N         $0.00     $0.00   $100.00     $0.00
17       222 04-Apr-88 Yoshimoto, Mai     $150.00 N         $0.00     $0.00   $150.00     $0.00
18       223 03-May-88 O'Connor, Sarah    $200.00 N         $0.00   $200.00     $0.00     $0.00
19       336 31-May-88 Martinez, Michael  $550.00 N         $0.00   $550.00     $0.00     $0.00
20       423 02-Jun-88 O'Connor, Sarah    $200.00 N       $200.00     $0.00     $0.00     $0.00
21       445 03-Jun-88 Choi Wedding       $450.00 N       $450.00     $0.00     $0.00     $0.00
22                                      ---------       --------- --------- --------- ---------
23                                      $1,800.00         $650.00   $750.00   $250.00   $150.00
24                                      =========       ========= ========= ========= =========
```

FIGURE 2. After you insert the invoice record shown in row 21, the model automatically calculates the current status of your receivables.

When an invoice reaches the 91-to-150-day bracket, you send a final notice, and after 150 days you remove the invoice from your journal and turn it over to an attorney who specializes in collections. These are the aging brackets that Today's Bouquets uses, but in your business, you might specify brackets based on your payment terms, industry standards, and your collection procedures.

BUILDING THE JOURNAL

To create the accounts receivable journal, first set the global column width to 10: Press slash, select Worksheet Global Column-Width, and enter *10* (in *Symphony* press MENU, select Settings Width, enter *10*, and select Quit). Now set the width of column C to 17: Position the pointer in column C, press slash and select Worksheet Column Set-Width (in *Symphony* press MENU and select Width Set), and enter *17*. Move the pointer to column E and use the same procedure to set the width of column E to 6.

Next create the broken dashed lines: Position the pointer in cell A7, enter a backslash, press the Spacebar once, and enter 17 hyphens. Copy this cell as necessary to create the broken dashed lines in rows 7, 14, and 21. To create the broken double-dashed lines in row 23, move the pointer to cell D23, enter a backslash, press the Spacebar once, and enter 10 equal signs. Then copy cell D23 to range F23..I23.

Next enter the labels and values shown in the following ranges of figure 1: A1..C11, A13..I13, A15..A20, and C15..E20. (For now leave cell C2 empty. You'll use a formula to generate the date.) To center the labels in row 13, select /Range Label Center (in *Symphony*, MENU Range Label-Alignment Center) and specify range A13..I13. Then follow the instructions in the Setup Table to enter formulas, format ranges, and copy ranges. To format a range, select /Range Format (in *Symphony*, MENU Format), make the specified selections, and indicate the range to format. To copy a range, select /Copy (in *Symphony*, MENU Copy), and specify the From range and the To range, as indicated in the Setup Table. When you're through, your model should look exactly like figure 1.

USING THE JOURNAL

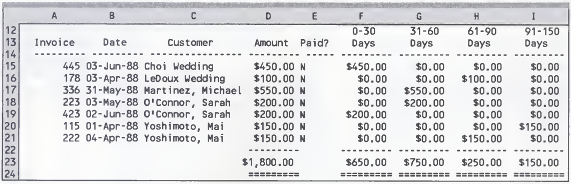
The core of your accounts receivable journal consists of a database where you record customer invoice information and let formulas track the aging of the receivables. Looking at figure 1, you can see that Today's Bouquets currently has six unpaid invoices, located in rows 15 through 20. Perhaps once a month, you should insert any new outstanding invoices and extract any paid invoices from the journal.

Suppose that it's July 1, 1988, as cell C2 of figure 1 indicates, and you want to update your journal. (When you use this model in your business, you'll edit the @DATE formula in cell C2 to reflect the current date. By doing so, you ensure that the formulas used to generate the aging report will accurately calculate the current status of your receivables.) You have only one invoice that you'd like to enter into your journal. You've just sent invoice number 445, dated June 3, 1988, to Elaine Choi for the $450 worth of bouquets that you designed for her wedding.

Make space for the entry by inserting a row in the journal. Position the pointer in cell A21, select /Worksheet Insert Row (in *Symphony*, MENU Insert Row), and press Return. Now enter the invoice information. Be sure to enter the invoice date as an @DATE formula; the formulas that calculate the aging require that you do so. In this situation, the formula will be @DATE (88,6,3). Assign the Date 1 format to cell B21 and the Currency 2 format to cell D21. In the *Paid?* column, enter an uppercase N for No, and then copy range F20..I20 to cell F21. The model automatically updates the current status of your receivables. As shown in figure 2, the addition of the Choi wedding invoice results in a total of $1,800 in outstanding invoices. Because this invoice is current, its amount, $450, appears in the 0-to-30-day bracket (cell F21) and the total for that bracket is increased from $200 (cell F22 of figure 1) to $650 (cell F23 of figure 2).

SORTING AND QUERYING YOUR JOURNAL

Once you've built your accounts receivable journal, you can use the Data Sort and Data Query commands to manipulate the invoice data. For example, you



```
      A         B             C                 D       E        F          G          H          I
12                                                            0-30      31-60      61-90     91-150
13  Invoice    Date       Customer           Amount   Paid?     Days       Days       Days       Days
14 --------- --------- ----------------  --------- -----  --------- --------- --------- ---------
15       445 03-Jun-88 Choi Wedding        $450.00 N       $450.00     $0.00     $0.00     $0.00
16       178 03-Apr-88 LeDoux Wedding      $100.00 N         $0.00     $0.00   $100.00     $0.00
17       336 31-May-88 Martinez, Michael   $550.00 N         $0.00   $550.00     $0.00     $0.00
18       223 03-May-88 O'Connor, Sarah     $200.00 N         $0.00   $200.00     $0.00     $0.00
19       423 02-Jun-88 O'Connor, Sarah     $200.00 N       $200.00     $0.00     $0.00     $0.00
20       115 01-Apr-88 Yoshimoto, Mai      $150.00 N         $0.00     $0.00     $0.00   $150.00
21       222 04-Apr-88 Yoshimoto, Mai      $150.00 N         $0.00     $0.00   $150.00     $0.00
22                                        ---------        --------- --------- --------- ---------
23                                       $1,800.00         $650.00   $750.00   $250.00   $150.00
24                                       =========        ========= ========= ========= =========
```

FIGURE 3. Use the Data Sort command to rearrange the invoice records. Here the invoice information has been sorted in alphabetical order according to customer name. You could also sort it according to amount due, invoice number, or date of invoice.

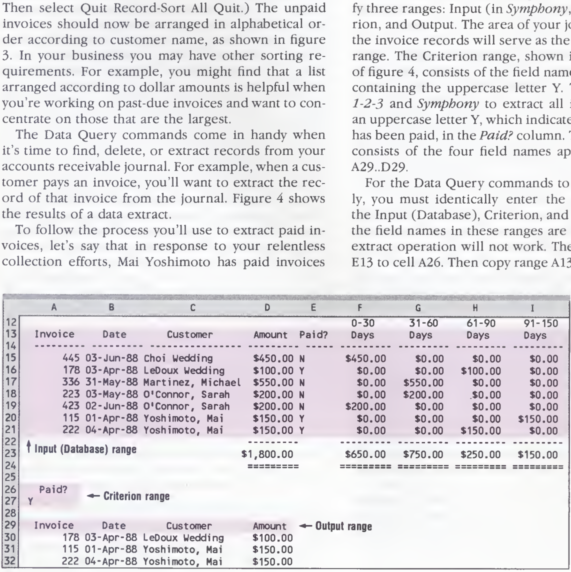
might want to list your unpaid invoices in alphabetical order by customer name. To do so, select /Data Sort Data-Range and specify range A15..I21. Next select Primary-Key, specify cell C15, select A for ascending sort order, then select Go. (In *Symphony* select MENU Query Settings Basic Database, specify range A14..I21, and select Quit. Select Sort-Keys 1st-Key, specify cell C15, and select A for ascending sort order. Then select Quit Record-Sort All Quit.) The unpaid invoices should now be arranged in alphabetical order according to customer name, as shown in figure 3. In your business you may have other sorting requirements. For example, you might find that a list arranged according to dollar amounts is helpful when you're working on past-due invoices and want to concentrate on those that are the largest.

The Data Query commands come in handy when it's time to find, delete, or extract records from your accounts receivable journal. For example, when a customer pays an invoice, you'll want to extract the record of that invoice from the journal. Figure 4 shows the results of a data extract.

To follow the process you'll use to extract paid invoices, let's say that in response to your relentless collection efforts, Mai Yoshimoto has paid invoices 115 and 222 and Ray LeDoux has paid invoice 178. Indicate that the invoices are paid by entering the uppercase letter Y in cells E16, E20, and E21 of the *Paid?* column. Once you've identified all the paid invoices, you'll want to extract them from the accounts receivable journal, since the journal should contain only outstanding invoices.

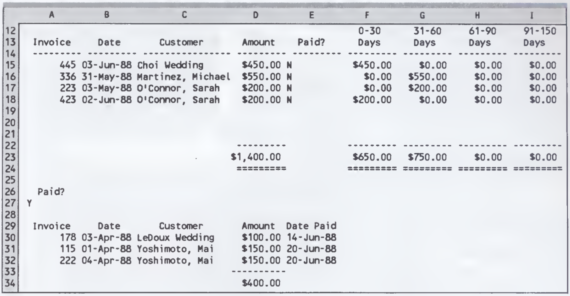
Before you can extract the paid invoices, you specify three ranges: Input (in *Symphony*, Database), Criterion, and Output. The area of your journal containing the invoice records will serve as the Input (Database) range. The Criterion range, shown in range A26..A27 of figure 4, consists of the field name *Paid?* and a cell containing the uppercase letter Y. This criteria tells *1-2-3* and *Symphony* to extract all invoices showing an uppercase letter Y, which indicates that the invoice has been paid, in the *Paid?* column. The Output range consists of the four field names appearing in range A29..D29.

For the Data Query commands to function properly, you must identically enter the field names in the Input (Database), Criterion, and Output ranges. If the field names in these ranges are not identical, the extract operation will not work. Therefore, copy cell E13 to cell A26. Then copy range A13..D13 to cell A29.



```
      A         B             C                 D       E        F          G          H          I
12                                                            0-30      31-60      61-90     91-150
13  Invoice    Date       Customer           Amount   Paid?     Days       Days       Days       Days
14 --------- --------- ----------------  --------- -----  --------- --------- --------- ---------
15       445 03-Jun-88 Choi Wedding        $450.00 N       $450.00     $0.00     $0.00     $0.00
16       178 03-Apr-88 LeDoux Wedding      $100.00 Y         $0.00     $0.00   $100.00     $0.00
17       336 31-May-88 Martinez, Michael   $550.00 N         $0.00   $550.00     $0.00     $0.00
18       223 03-May-88 O'Connor, Sarah     $200.00 N         $0.00   $200.00     $0.00     $0.00
19       423 02-Jun-88 O'Connor, Sarah     $200.00 N       $200.00     $0.00     $0.00     $0.00
20       115 01-Apr-88 Yoshimoto, Mai      $150.00 Y         $0.00     $0.00     $0.00   $150.00
21       222 04-Apr-88 Yoshimoto, Mai      $150.00 Y         $0.00     $0.00   $150.00     $0.00
22                                        ---------        --------- --------- --------- ---------
23                                       $1,800.00         $650.00   $750.00   $250.00   $150.00
24                                       =========        ========= ========= ========= =========
25
26   Paid?
27 Y
28
29  Invoice    Date       Customer           Amount
30       178 03-Apr-88 LeDoux Wedding      $100.00
31       115 01-Apr-88 Yoshimoto, Mai      $150.00
32       222 04-Apr-88 Yoshimoto, Mai      $150.00
```

FIGURE 4. This figure shows the effect of using the Data Query Extract command to extract paid invoices from your journal. When a customer pays an invoice, you enter a Y in column E of the journal. The Criterion range contains a Y, indicating that all records containing a Y in the *Paid?* column will be extracted.



```
        A        B            C              D         E         F         G         H         I
12                                                             0-30     31-60     61-90    91-150
13  Invoice    Date      Customer         Amount    Paid?      Days      Days      Days      Days
14  --------- --------- ---------------- --------- --------- --------- --------- --------- ---------
15       445 03-Jun-88 Choi Wedding      $450.00 N           $450.00     $0.00     $0.00     $0.00
16       336 31-May-88 Martinez, Michael $550.00 N             $0.00   $550.00     $0.00     $0.00
17       223 03-May-88 O'Connor, Sarah   $200.00 N             $0.00   $200.00     $0.00     $0.00
18       423 02-Jun-88 O'Connor, Sarah   $200.00 N           $200.00     $0.00     $0.00     $0.00
19
20
21
22                                      ---------           --------- --------- --------- ---------
23                           .         $1,400.00             $650.00   $750.00     $0.00     $0.00
24                                      =========           ========= ========= ========= =========
25
26    Paid?
27  Y
28
29  Invoice    Date      Customer         Amount  Date Paid
30       178 03-Apr-88 LeDoux Wedding    $100.00 14-Jun-88
31       115 01-Apr-88 Yoshimoto, Mai    $150.00 20-Jun-88
32       222 04-Apr-88 Yoshimoto, Mai    $150.00 20-Jun-88
33                                     ----------
34                                       $400.00
```

FIGURE 5. To create a monthly receivables record, you add a column titled *Date Paid*, in which you enter the date when the invoice was paid. Then enter an @SUM formula that totals the paid invoices for the month. This record makes it easy to review past accounts receivable. Then to get ready for the next batch of invoices, you delete all paid invoices from the journal. Doing so in this example leaves rows 19 through 21 blank.

Enter the uppercase letter Y in cell A27.

Now you're ready to tell *1-2-3* (or *Symphony*) where the ranges are located and perform the actual extract. In *1-2-3* select /Data Query Input, specify range A13..I21, select Criterion, specify range A26..A27, select Output, and specify range A29..D29. Now to extract the paid invoices, select Extract Quit. (In *Symphony* select MENU Query Settings Basic Database, specify range A13..I21, select Criterion, specify range A26..A27, select Output, and specify range A29..D29. Now to extract paid invoices, select Quit Quit Extract Quit.)

Copies of records that meet the selection criteria appear in the Output range, as shown in rows 30 through 32 of figure 4. This extract operation pulls out copies of the paid invoices from the journal. As you see, the LeDoux wedding and the two Yoshimoto invoices appear in the Output range.

Although you've extracted the paid invoices from the journal, you still need to keep track of them. This information makes it easy to calculate sales collections and to review past accounts receivable. For example, looking over your past receivables reports, you may find that Ray LeDoux is consistently over a month late with his payments. Based on this historical information, you can decide whether or not you wish to continue extending credit to him. By adding a column for the date the invoice was paid and a formula that totals the collections for that period, you can create a monthly receivables report. To build the report, begin by resetting the width of column E to 10. Select /Worksheet Column Set-Width (in *Symphony*, MENU Width Set) and enter *10*. Now enter the label shown in cell E29 and the dividing line in cell D33 of figure 5. Use @DATE formulas to enter the invoice payment dates shown in range E30..E32. Assign the Date 1 format to range E30..E32. Then enter the formula @SUM(D30..D32) in cell D34 to total the monthly collections. Assign the Currency 2 format to cell D34.

Your next step is to delete the original invoices from the journal. To delete these paid records, select /Data Query Delete Delete Quit (in *Symphony,* MENU Query Delete Yes Quit). Range A15..I24 of figure 5 contains the results of your deletions. As you can see, the totaling formulas in row 23 are updated to reflect the current status of your receivables.

You've now expanded your accounts receivable journal. By using the Data Query Extract and Delete commands at the end of each month, you have a worksheet that reflects both the unpaid invoices as of the end of the month and the details of your sales collections. Save each month's journal under a new file name—for example, JUL88, AUG88, and SEP88. To create the next month's journal, retrieve the previous month's journal (for example, SEP88), and immediately resave the file under the current month (for example, OCT88). Then enter the current month's invoices (following the process described earlier when you entered the Choi wedding invoice data), mark those invoices that have been paid during the month, and then use the Data Query Extract and Delete commands to bring the journal up to date.

This model enables you to monitor and control a low volume of receivables; it is best suited to those businesses with only a few hundred invoices. If your business has a large volume of invoices, you may want to consider purchasing an off-the-shelf accounts receivable package that is specifically tailored to handle such volume. ■

Stephen L. Nelson wrote about cash flow in the June installment of the Small-Business Series.

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MORE TIPS ON USING LOTUS PRODUCTS

1-2-3/SYMPHONY

PROTECTING MASTER FILES—ADDENDUM

Since I submitted my technique for preventing the accidental overwriting of master files by changing the file extension in DOS [February], I have learned a way to protect a master file with the *1-2-3* File Save command. You can enter a file name as well as an extension other than .WK1. For example, after selecting /File Save, enter *filename.wkp* (I use the *p* to designate a protected master file).

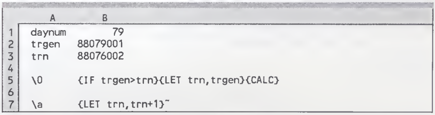
With this change in the file extension, *1-2-3* will be able to read and retrieve the file, but will not write over the file when you resave it. It will create a second file with the extension .WK1. If you need to make changes to the master file and resave it under its original name, you can select /File Save and reenter the original file name and extension.

Frank R. Johnson
Stockton, Calif.

This does not work in 1-2-3 *Release 1A, but it works in all releases of* Symphony. *There is a slight difference in* Symphony *Release 1/1.01. The second time you select SERVICES File Save, the program doesn't save the file with the default .WRK extension. It will save the file with the .WRP extension.*

NUMBERED TRANSACTION RECORDS

I've designed several *1-2-3* databases that contain a large number of records. Sometimes the Data Query command seems to be confused by duplicate or similar information in key fields. I've had to use multiple criteria in applications where several sales quotes were given to the same customer in one day. To solve this problem, I've devised the following method to assign a unique, date-related transaction number to each database record. Now I need to enter only the unique transaction number as the criterion to find a record.



```
     A          B
1    daynum           79
2    trgen     88079001
3    trn       88076002
4
5    \0        {IF trgen>trn}{LET trn,trgen}{CALC}
6
7    \a        {LET trn,trn+1}~
```

Make sure your computer's startup date is correct to generate these consecutive date-related transaction numbers. Enter the labels shown in the figure and assign the labels in column A as range names for the adjacent cells in column B: Press slash [MENU in *Symphony*], select Range Name Labels Right, and specify range A1..A7. Next enter the following formulas:

Range name	**Formula**
daynum	@INT(@NOW) − @DATE (@YEAR(@NOW) − 1,12,31)
trgen	((@YEAR(@NOW)*1000 + daynum)*1000) + 1

The formula in *daynum* calculates the number of days since last December 31 to determine today's day number. The first part of the formula in *trgen* multiplies the year number of today's date by 1000 and adds *daynum* to it. The formula then multiplies that sum by a power of 10 (10^3 in this case) and adds 1 to yield today's first transaction number. This formula allows assignment of 999 unique transaction numbers in one day. You can change this to more or fewer transaction numbers by changing the power of 10, which the formula uses in the latter multiplication. For example, if the multiplier is 10^2, or 100, the maximum unique numbers will be 99; similarly, if the multiplier is 10^4, or 10,000, the maximum unique numbers will be 9999.

Each time you retrieve the file to add new orders or edit existing ones, the {IF} statement in the macro named \0 checks whether the number in *trgen* is greater than the most recent transaction number in *trn*. This macro statement will reinitialize the *trn* value only if the date has increased since the last time you retrieved the file. Thus, the transaction numbers are continuous and consecutive regardless of how many times you save and retrieve the same file in one day.

You can place the current value of *trn* into each record by incorporating the macro command in cell B7 in your own application's data-input macro. This will automatically increase the transaction number after each record is complete.

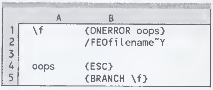
Dean Ennis
Philadelphia, Pa.

In Symphony *you'll need to select SERVICES Settings Auto-Execute Set and enter* B5 *(the starting cell of the \0 macro), in order to execute this macro automatically upon retrieving the file. This idea doesn't work in* 1-2-3 *Release 1A.*

← CIRCLE 120 ON READER SERVICE CARD

BREAKING OUT OF AN ENDLESS LOOP

My *1-2-3* Release 2 macros sometimes get stuck in endless loops. In most cases, holding down the Control key and pressing Break will stop the macro. But in an endless loop like the following example, which contains an {ONERROR} statement, this method of breaking out of a loop does not work.



```
      A          B
1   \f         {ONERROR oops}
2              /FEOfilename~Y
3
4   oops       {ESC}
5              {BRANCH \f}
```

I've found two methods of stopping such a loop. The first is to shut off and restart the computer (and possibly lose the data you didn't save). The other is to hold down the Shift key and press the PrintScreen key, then immediately hold down the Control key and press the Break key while the screen is just beginning to print.

U. Erkmen
Calgary, Alberta

The second method assumes that your printer is on-line. If not, you will see an endless flashing Wait *sign in the top-right corner of the screen. Also, you must be very quick in pressing the Shift-PrintScreen and Control-Break sequences or the loop will continue. If your first attempt does not stop the macro loop, try it again, pressing the key combinations a bit faster. Before running any macro, it's a good idea to save your file. If an error occurs, you can retrieve the file and save keystrokes. Pressing Control-Break twice also works.*

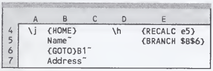
These techniques also work in Symphony.

RERUNNING ONLY PART OF A MACRO II

In the January issue, Michael Pash suggested a method for running only part of a macro. I'd like to share my technique, which lets you use his method as a debugging tool with any macro. The macro *\h* contains two lines. The first line recalculates the formula in the second line. Cell E5 contains the following formula:

+"{BRANCH "&@CELLPOINTER("address")&"}"

This formula is recalculated by {RECALC E5}, which results in a BRANCH statement that executes a macro wherever the cell pointer is at that time. For example, if you place the pointer on the example macro statement in cell A6 and start *\h* by pressing MACRO-H, you'll see that only the macro statements in cells A6..A7 are executed.



```
    A     B        C      D       E
4   \j  {HOME}           \h     {RECALC e5}
5       Name~                   {BRANCH $B$6}
6       {GOTO}B1~
7       Address~
```

I've found this macro very helpful as an all-purpose branching tool. For example, when I edit a lengthy macro and need to change starting positions often to edit and run line by line, this two-line macro eliminates the need to create and delete a temporary range name each time.

John Hribernick
Safeway Stores
Portland, Oreg

If you use this two-line macro in different worksheets, make sure you edit the RECALC statement to refer to the second line of the \h macro. This technique doesn't work in 1-2-3 *Release 1A.*

NOTICE: TOWN MEETING

Send us your Good Ideas

You're invited to participate in the *LOTUS* Town Meeting issue that will be published later this year. To take part, send us your favorite Good Ideas about using *1-2-3* and *Symphony*. We'll print as many as space allows, so jog your memory and tell us which Good Ideas you found most useful and why.

To share your favorite Good Ideas with the rest of the *LOTUS* community, we need your response by August 1st, so get cracking! We'll acknowledge all the items we receive, but we cannot return unused material. Send your Good Ideas today to:

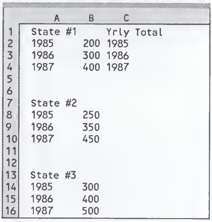
LOTUS Town Meeting
c/o Good Ideas
P.O. Box 9123
Cambridge, MA 02139-9123

SUMMING EVERY NTH CELL IN A COLUMN

We have spreadsheets with the following format:

State #1
1985
1986
1987

This same format is repeated down the column for each of the 50 states. We then need to find subtotals for each year for all states. To do this, you need either to copy the 1985 figures for all states to another column and use an @SUM formula or to write a very long formula with +B2+B8+B14, and so on, to the last state's figures for that year. I use the following quick method for writing these long formulas:



```
       A         B     C
1   State #1          Yrly Total
2   1985         200  1985
3   1986         300  1986
4   1987         400  1987
5
6
7   State #2
8   1985         250
9   1986         350
10  1987         450
11
12
13  State #3
14  1985         300
15  1986         400
16  1987         500
```

Assume you have a spreadsheet like the figure above, with each year's data for each state in every sixth row. Place the cell pointer in a blank column, such as column E. Select /Data Fill (in *Symphony*, MENU Range Fill), specify E2..E4 as the Fill range, 2 as the Start number, 6 as the Step number, and press Return to accept the default Stop number. Then enter this formula in cell F2:

+"+B"&@STRING(E2,0)

Copy the formula from cell F2 to range F3..F4. Now use the Range Name command to name cell F2 *\a*. Place the cell pointer where you want the total to appear (in this example, cell D2 for the first time through), then hold down the MACRO key and press A. Press return to enter the formula.

To arrive at the totals for each of the next two years, you need to rerun only the Data Fill (Range Fill in *Symphony*) command and change the Start number to 3 for 1986 and to 4 for 1987. The Step number remains the same. The formulas in range F2..F4 reflect the new cell addresses. So when you run \a again, with your pointer in the appropriate cell, the new formula and total appears.

It's important to note that a cell entry is limited to 240 characters. Therefore, if your formula will result in more than 240 characters, you'll need to repeat this method more than once for each year's total and then sum the values of the resulting formula cells.

Mark Naigles
Upper Darby, Pa

You can avoid having to press Return after running the macro by entering a tilde (~) in the cell just below your last string formula entry, for example in cell F5. This doesn't work in Release 1A.

TRANSLATING ILLEGAL FILE-NAME CHARACTERS

I use *1-2-3* Release 2 at the office, but I have *1-2-3* Release 1A at home. I use the Translate utility to convert files from Release 2 to Release 1A. I found that after successfully translating a file called T-BILLS, I couldn't retrieve it in Release 1A. I got the error message *Illegal character in filename.*

The problem occurs because Release 1A does not allow the hyphen character in a file name, while Release 2 does. To solve this problem, I exited to DOS and at the prompt, used the DOS RENAME command as follows:

```
REN T-BILLS.WKS T_BILLS.WKS
```

When I reloaded *1-2-3*, I was able to retrieve the renamed file without any error message.

William J. Coffey
Pace University
New York, N.Y.

Note that the file was translated from a Release 2 WR1 file to a Release 1A WKS file before it was renamed to eliminate the illegal-character hyphen. All releases of Symphony *allow the hyphen character in a file name.*

1-2-3

CREATING FANCY BORDERS

Using *1-2-3* Release 2.01, I design applications for data input by others. I usually begin with a few introductory screens and often wish I could use the full ASCII character set to create some snazzy borders, similar to the preliminary *1-2-3* Access menu.

I've found that I can do this by going into the *1-2-3* Install program and changing my Text Display driver choice to *Universal Text Display–ASCII–No LICS*. To do this, select Advanced Options at the Install program's main menu. Choose Modify Current Driver Set, choose Text Display, and select the last option on the list. Choose Return to Menu, and then select Save Changes. Save the driver set under another name, for example NOLICS, so that you can switch back and forth between your original driver set and this one.

To start *1-2-3* and use a new driver set, rather than enter *lotus* or *123*, enter either *lotus nolics* or *123 nolics*. You can now use the @CHAR function with the numbers 128 to 254, especially numbers 176 to 223, to create fancy borders and other non-LICS characters. You can also display these characters by using the COMPOSE key and a compose sequence as shown in Appendix 2 in the *1-2-3 Reference Manual*.

When you design a worksheet with the higher ASCII characters and with the ASCII driver installed, you need to inform others who will use the worksheet that they also need to use a modified driver set with the non-LICS Text Display driver installed. If they don't, the borders will display as fallback characters or blanks.

Thomas M. Wood
Sprague Electric Co.
Worcester, Mass.

The Universal Text Display ASCII-No LICS driver is not available in 1-2-3 *Releases 1A and 2.*

UNWANTED RANGE NAMES AFTER FILE XTRACT

I often build new spreadsheets by using portions of older ones. I use the File Xtract command to extract the section of an existing spreadsheet and then retrieve this extracted portion and build my new worksheet around it. Unfortunately, the extracted file contains all the range names from the original file.

To speed up this chore of finding and deleting the unnecessary range names, I use the Range Name Table command. First press End Home and make a note of the lower-right corner of the new worksheet. Then place your cell pointer in an unused section of the worksheet, press slash, select Range Name Table, and press Return. *1-2-3* creates a table of all range names in one column with their corresponding addresses in the column to the right. Use the Data Sort command to sort these two columns by cell addresses: Press slash, select Data Sort Data-Range, and specify the entire range-name table. Select the column with the cell addresses as the primary sort key, specify A for ascending order, then select Go.

You can now safely erase any items in the range-name table that do not lie above or to the left of the lower-right cell address of the active area. Next use the Range Name Reset command to clear out all existing range names in the spreadsheet. Then use the edited range-name table to manually re-create the range names with the corresponding cell addresses.

E. Anthony Golda
Brim & Associates
Portland, Oreg

If you're left with many range names to re-create, after you've used the Range Name Reset command, you can use the following macro. If the edited range-name table is in range AC1..AD25, for example, enter this string formula in cell AB1:

```
+"/RNC"&AC1&"~"&AD1&"~"
```

Copy the formula from cell AB1 to range AB2..AB25, then assign it a macro name. To do so, enter the label \r in cell AA1, and with the cell pointer in cell AA1, press slash, select Range Name Labels Right, and press Return. Now hold down the MACRO key (Alt on most computers) and press R: 1-2-3 *creates the remaining range names with their corresponding addresses. This technique doesn't work in* 1-2-3 *Release 1A.*

This material is prepared by the Technical Editors, with the help of the Lotus Product Support staff.

WRITE US

Do you have a favorite technique or way of using 1-2-3, Symphony, Jazz, or other Lotus product? Share it! We'll send you $25 if we print your letter. Send them to: Good Ideas, LOTUS *Magazine, P.O. Box 9123, Cambridge, MA 02139–9123.*

Q&A

ANSWERS TO YOUR QUESTIONS ABOUT LOTUS PRODUCTS

CONTEST

APRIL CONTEST RESULTS

In the April issue we asked users of *1-2-3* Release 2/2.01 and *Symphony* to submit the best formula for converting dates entered as labels in mm-dd-yy format (for example, 2-28-88) to a format that can be used in formulas. Although mm-dd-yy is a common format, it isn't one that the @DATEVALUE function can handle. The winning formula, we said, shouldn't require leading zeros for single-character dates. That is, the formula should work for 2-2-88 as well as for 02-02-88.

A few of the entries we received used macros; however, the contest called for a formula—the best and most efficient method, in this case.

Many entries were similar to the following formula:

```
@DATEVALUE(@LEFT(@RIGHT
  (A1,2)&“−”&A1,@LENGTH(A1)))
```

This formula changes the date order to yy-mm-dd, allowing the @DATEVALUE function to work. However, the formula requires you to select /Worksheet Global Default (in *Symphony*, SERVICES Configuration) Other International Date D, which allows *1-2-3* and *Symphony* to recognize the format yy-mm-dd and to recognize a dash (−) as the date delimiter.

The winning formula is:

```
@DATEVALUE(@REPLACE
  (@REPLACE(A1,@FIND
  (“−”,A1,1),1,“/”),
  @FIND(“−”,A1,3),1,“/”))
```

Let's divide this complex formula into its components and see how it works.

The @DATEVALUE function returns the serial number of a date entered as a label. For the @DATEVALUE function to work, the label it references must have the format month/day/year. The month and day elements may be either one or two digits, but the separators must be slashes; the @DATEVALUE function doesn't recognize date elements separated by dashes unless the date is entered as @DATEVALUE("23-Aug-84").

The winning formula first replaces the slashes in the date label with dashes, then uses the resulting label as the argument in an @DATEVALUE function. The formula uses the @REPLACE and @FIND functions to make the substitutions.

The @REPLACE function has the following syntax:

@REPLACE(*label,start,*
characters,newstring)

This function places *newstring* into *label*, replacing the characters indicated by *start* and *characters. Start* indicates the character at which the replacement operation should begin, and *characters* indicates the number of characters to replace. Hence, the formula @REPLACE("2-23-88",1,1,"/") means, "Replace the first dash in the label *2-23-88* with a slash." In this case, the *start* and *characters* values are both 1. The function replaces one character, starting with the second character in the string.

Our contest stipulated that the formula must be able to deal with date labels that have either one- or two-digit month and day elements. You know that the formula must always replace single characters (dashes), but whether it must replace the second or third character of the date label depends on the label in question. That's where the @FIND function comes in.

The @FIND function returns the location of a string within another string. It has the following syntax:

@FIND(*character,string,start*)

This function looks within *string* beyond the location indicated by *start* for the first occurrence of *character*. Hence, the formula @FIND("−","2-23-88",0) returns 1, and the formula @FIND("−","2-23-88",3) returns 4. The winning formula uses the @FIND function to determine the locations of the dashes within the date strings.

The winning formula's nested @REPLACE functions enable the result of one function to serve as the argument of another. In other words, the first @REPLACE function calculates a string that contains one slash and one dash. The second function acts on the result of the first function and replaces the remaining dash with a slash. The final result becomes the argument of an @DATEVALUE function that returns the serial number of the date label.

Winning entries were submitted by Mary Baechtel, Derwood, Md.; William Barney, Appleton, Wis.; Steven Beauvais, New Baltimore, Mich.; Bruce Benson, Cedar Rapids, Iowa; Jacob Braun, New York, N.Y.; Raymond Butner, Irwindale, Calif.; Dennis Campbell, Grand Rapids, Mich.; Jana Clark, Garland, Tex.; John Davis Jr., Baltimore, Md.; Jerry Gaston, Oak Brook, Ill.; David Goldstein, Essexville, Mich.; Marty Golob, Cleveland, Ohio; Gano Harris, Carrollton, Tex.; Chris Hughes, Omaha, Nebr.; Steven Hunsucker, Columbus, Ind.; William Isler, Fort Myers Beach, Fla.; Mike Juby, Hutchinson, Kans.; Tim Knight, New Boston, N.H.; David McBride, Berkley, Mich.; Arnie Ostrin, Houston, Tex.; David Shimko, Los Angeles, Calif.; John Skelly, Sacramento, Calif.; Larry Stout, McCordsville, Ind.; Dennis Taylor, Boulder, Colo.; Jeff Winchell, Chicago, Ill.

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- Reports include stock status, sales history, adjustments, back orders, below minimum and on order
- Audit trails

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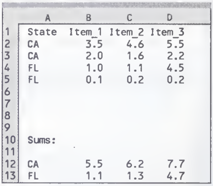
CIRCLE 121 ON READER SERVICE CARD

1-2-3/SYMPHONY

USING DATA TABLE TO SUM COLUMN

Q. I am trying to build a macro that will sum the columns of a spreadsheet according to the values in some index column, as in the following figure.



```
      A       B       C       D
1   State   Item_1  Item_2  Item_3
2   CA        3.5     4.6     5.5
3   CA        2.0     1.6     2.2
4   FL        1.0     1.1     4.5
5   FL        0.1     0.2     0.2
6
7
8
9
10  Sums:
11
12  CA        5.5     6.2     7.7
13  FL        1.1     1.3     4.7
```

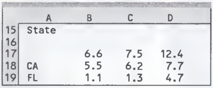
My assumptions are that the index variables in the first column are sorted, that index variables may be numeric or alphabetic, and that the number of rows and columns is unknown. Can you help me to implement this basic analysis function?

Harvey Finberg
U.S. General Accounting Office
Washington, D.C.

A. You don't need a macro solution here—you can use the Data Table 1 command (Range What-If 1-Way in *Symphony*) together with the database statistical functions. First copy the field name of your index field (in this case, *State*) to a blank area (cell A15 in the following figure). This will serve as your Criterion range. Enter the unique variables (*CA* and *FL* in this case) in range A18..A19. If you have a very large list of variables, use the Data Query Unique command (MENU Query Unique in *Symphony*) to isolate a list of unique variables. Enter the following formulas in range B17..D17. To shorten the task, enter the formula in cell B17, copy cell B17 to range C17..D17, then edit the offset numbers (the formulas' second argument) in cells C17 and D17.

Cell	**Formula**
B17	@DSUM($A$1..$D$5, 1,$A$15..$A$16)
C17	@DSUM($A$1..$D$5, 2,$A$15..$A$16)
D17	@DSUM($A$1..$D$5, 3,$A$15..$A$16)

Select /Data Table 1 (MENU Range What-If 1-Way in *Symphony*), specify range A17..D19 as the Table range, and indicate cell A16 as input cell. *1-2-3* and *Symphony* will produce the table shown below.



```
      A       B       C       D
15  State
16
17            6.6     7.5    12.4
18  CA        5.5     6.2     7.7
19  FL        1.1     1.3     4.7
```

STOP PRINTING AT END OF EACH PAGE

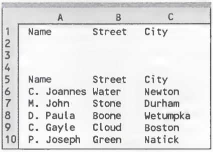
Q. My printed reports are usually four to six pages long. How can I stop printing at the end of each page so that I can insert individual sheets or realign the paper?

William L. Gardner
Triple "L" Ranch
Skull Valley, Ariz.

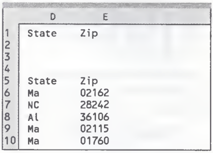
A. In *1-2-3* select /Worksheet Global Default Printer Wait Yes Quit Quit to make your printer pause at page breaks during the current work session. In *Symphony* you can make the printer pause at the end of each page by selecting SERVICES Print Settings Page Wait Yes.

LABEL/NUMERIC ZIP CODES

Q. I want to search my database for records within a certain geographical area (due to space limitations, the following screen is split into two sections):



```
       A           B         C
1   Name        Street    City
2
3
4
5   Name        Street    City
6   C. Joannes  Water     Newton
7   M. John     Stone     Durham
8   D. Paula    Boone     Wetumpka
9   C. Gayle    Cloud     Boston
10  P. Joseph   Green     Natick
```



```
       D        E
1   State    Zip
2
3
4
5   State    Zip
6   Ma       02162
7   NC       28242
8   Al       36106
9   Ma       02115
10  Ma       01760
```

For example, I'd like to locate records that contain a zip code greater than 01700 and less than 02199. I entered the zip codes as labels so that the leading zero would print, but now I can't use a criterion formula that evaluates them numerically. Any ideas?

Hannelore K. Merry
Chesapeake Laser Systems
Lanham, Md.

A. In *1-2-3* Release 2/2.01 and *Symphony*, you can select records that contain zip codes greater than 01700 and less than 02199 by entering the following criterion formula in cell E2 of your worksheet's Criterion range:

```
@VALUE(E6)>01700#AND#
  @VALUE(E6)<02199
```

The @VALUE function converts into a value any label that looks like a number.

MULTILINE HEADERS

Q. I use the Print Printer Options Header command to specify a header, but this allows me to specify only a one-line header. How can I print a range with, for example, a multiple-line header containing embedded print codes for enlarged print?

D. MacMillan
Ottawa, Ontario

A. You can do this by specifying your headers as border rows (top labels in *Symphony*). First enter your header labels in two or more blank rows on the worksheet. Next insert a blank row above the header rows and embed in it the appropriate setup string (in *Symphony*, initialization string) for enlarged or expanded print. If you use an Epson printer, for example, enter the string ¦¦\027W1*. Then, in a blank row following the header rows, enter the string ¦¦\027@*, which is the master reset code. In each case, enter the setup string in the leftmost column of the header range.

Next, instead of specifying a header, select /Print Printer Options Borders Rows (in *Symphony*, SERVICES Print Settings Other Top-Labels) and specify the rows you want to print at the top of each page. The border rows must include both of the rows that contain setup strings. Finally, specify your print range and other print settings. When you select Align Go, your border rows will print in expanded print at the top

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of each page; the actual print range will print in the default print style. This technique lets you create multiple-line headers in all releases of *1-2-3* and *Symphony*, although you can't embed setup strings in a *1-2-3* Release 1A worksheet.

SORTING AND KEEPING ORDER IN RECORDS

Q. I know *1-2-3* can perform several database functions. Can it sort one field in a database without mixing up all the other fields?

W. A. Norvell
U.S. Department of Agriculture
Ithaca, N.Y.

A. No matter how many fields you specify in a sort operation, *1-2-3* and *Symphony* keep database records intact. When you specify one field to sort on, *1-2-3* rearranges each complete record (with all its fields) according to the field and the sort order you specified.

To perform a sort operation, select /Data Sort Data-Range and specify all the rows and columns of the database that contain records (excluding field headers) in the database. Specify the Primary sort key, the order of sort (ascending or descending), and if necessary, the Secondary sort key. When you select Go, the program sorts all the fields and records according to the sort keys and the sort order you specified.

To sort in a *Symphony* SHEET window, select MENU Query Settings Basic Database and specify all the rows and columns containing records, including the field headers. Select Quit Sort-Keys 1st-Key, indicate the appropriate field, and enter the desired sort order. If you wish, use the same commands to assign a second and third sort key. Then select Quit Record-Sort All.

RENAMING A RANGE

Q. I have a template file with utility macros, including my two favorite macros: one that saves and one that saves and prints. I use the File Combine Copy command to copy these macros from the template file into my new worksheets; then I name them \s and \p, respectively. Occasionally, I reverse the names by accident when assigning them. I then try to restore the macros to their correct names using the Range Name Create command. I enter the correct range name, specify the new range, and press Return. But when I then use one of the macros, I find that the wrong macro runs. My only solution is to use the Range Name Delete command to delete the problem range names and then re-create the range names using the Range Name Create command. Why can't I reassign a range name to a new range address without first deleting the range name?

Edward F. Borkowski
Accel Partners
Princeton, N.J.

A. Your solution—to delete the old macro name and then re-create it—is the only one that works in this situation. When you assign two names to a single range, the names become linked. Trying to reassign one name results in both names being reassigned. Deleting a name breaks its link to other names and lets you reassign it independently.

You might altogether eliminate the error that causes this problem. Enter the macros' names as labels in cells to the left of the macros. When you bring the macros into a new worksheet, combine the name labels along with the macros. Then use the Range Name Labels Right command to assign the labels as range names.

USING @VLOOKUP IN ORDER ENTRY

Q. I use *Symphony* and I need a formula that will help me manage my sales worksheet. For example, when I enter a part number in column A, I want *Symphony* to search column E to see if that part number exists and, if so, place the corresponding quantity from column F into column B. Entries in column A will seldom be in alphabetical order. Is there such a formula?

Charles L. Mattias
Taylor Electric Co.
Milwaukee, Wis.

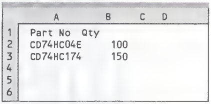
A. The @VLOOKUP function in *1-2-3* Releases 2 and 2.01 and *Symphony* will do the job. This function uses the following syntax:

@VLOOKUP(*selector-value*, *column-range*,*offset-number*)

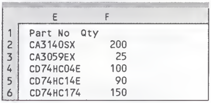
Selector-value is the value you enter in column A, *column-range* refers to the range containing part numbers and quantities (E2..F6), and *offset-number* identifies the column within *column-range* from which *1-2-3* or *Symphony* should return a value.

Enter the following formula in cell B2 of the figure below (due to space limitations, this screen is split into two sections):

@VLOOKUP(A2,E2..F6,1)



```
         A           B     C    D
1  Part No  Qty
2  CD74HC04E       100
3  CD74HC174       150
4
5
6
```



```
         E           F
1  Part No  Qty
2  CA3140SX        200
3  CA3059EX         25
4  CD74HC04E       100
5  CD74HC14E        90
6  CD74HC174       150
```

Note that you enter the *column-range* argument with absolute references so that it remains constant as you copy the formula to other cells in column B. The formula returns ERR when you enter in column A a part number that isn't in the list in column E.

@SUM WITH VARIABLE START/END CELLS

Q. I have a problem specifying *Symphony*'s @SUM function when the beginning or ending cell of the range to be summed is variable. For example, to total range A1..A100, I use the formula @SUM(A1..A100). However, in the event that the beginning or ending cell of that range changes, I need the @SUM formula to be updated automatically, without my having to edit the formula manually. I tried entering the string *A1..A100* in cell C1 and then referencing that cell in the @SUM formula, but the formula evaluates to ERR. Is there any solution to this problem?

Fred G. Cheney
Salt Lake City, Utah

A. You can use the string concatenation capability of *1-2-3* Release 2/2.01 and *Symphony* to solve this problem. Enter the following formula in cell C1:

+"@SUM(A1..A"&@STRING(E1,0)&")~"

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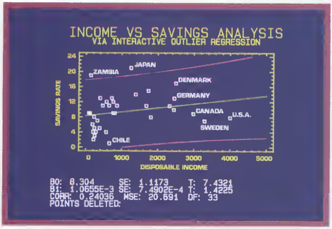
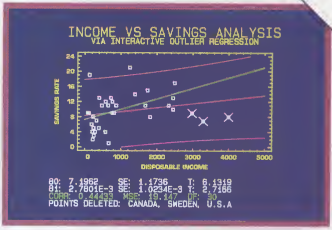


```
B0:  8.304      SE:  1.1173    T:  7.4321
B1:  1.0655E-3 SE:  7.4902E-4 T:  1.4225
CORR:  0.24036  MSE:  20.691  DF:  33
POINTS DELETED:
```

Select the points you want to remove from your regression model . . .



```
B0:  7.1962     SE:  1.1736    T:  6.1319
B1:  2.7801E-3 SE:  1.0234E-3 T:  2.7166
CORR:  0.44433  MSE:  19.147  DF:  30
POINTS DELETED:  CANADA,  SWEDEN,  U.S.A
```

. . . Then press F6 to refit the model and recalculate the statistics.

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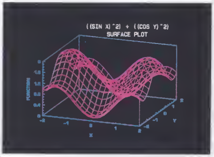

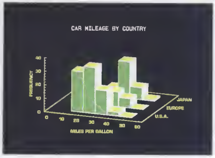

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CIRCLE 122 ON READER SERVICE CARD

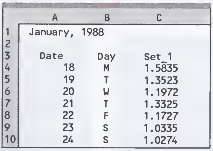
In cell E1 enter the row number of the last cell you want included in the total. You need to run this formula as a macro, so use the Range Name Create command to assign the name *\a* to cell C1. Place the cell pointer on the cell to contain the total, then hold down the MACRO key (Alt on most computers) and press A. The @SUM formula will update to show the new total. Anytime you need to sum a different subset in your column, enter in cell E1 the row number of the last cell and run the macro again.

1-2-3

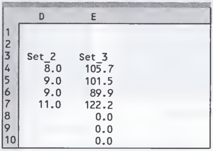
AVERAGING ERRS AND ZEROS

Q. I have a problem using the @AVG function in *1-2-3* Release 2.01. The following is a sample worksheet of the type of data I work with. (Due to space limitations, this screen is split into two sections.) I enter data daily, and cell E4 contains the following formula, which I copy to range E5..E10:

```
@IF(@ISERR(D4*8.34*C4),0,
  D4*8.34*C4)
```



```
        A           B          C
 1   January, 1988
 2
 3     Date        Day       Set_1
 4          18      M       1.5835
 5          19      T       1.3523
 6          20      W       1.1972
 7          21      T       1.3325
 8          22      F       1.1727
 9          23      S       1.0335
10          24      S       1.0274
```



```
        D         E
 1
 2
 3   Set_2     Set_3
 4     8.0      105.7
 5     9.0      101.5
 6     9.0       89.9
 7    11.0      122.2
 8                0.0
 9                0.0
10                0.0
```

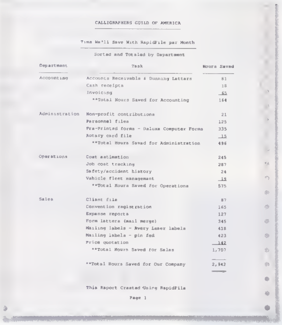
This formula returns a positive value unless the result is ERR, in which case the formula substitutes 0. When I use the @SUM function to total range E4..E10, I get the correct sum, but when I use the @AVG function to find the average, I get an erroneous result. This function seems to count all cells, including the ones containing 0, and use all cells as a denominator. How can I solve this dilemma?

David H. Beecher
City Wastewater Dept.
Lebanon, N.H.

A. You need to use the @DAVG database statistical function, along with a criterion that tells *1-2-3* to use only the cells with positive results. To do this, you need to set up your database to meet *1-2-3's* requirements: The first row must contain unique field-name labels, and fields must be in consecutive columns. The second row should contain your first record. Copy the field name of the field you'd like to average to a blank area on the worksheet (in this example, copy cell E3 to cell A15). This will be the field name of your Criterion range. Then enter the formula +E4>0 in cell A16.

Now enter the following @DAVG formula in cell A13, where A3..E10 is the Input range, 4 is the offset number of the column you want to average (*1-2-3* considers the first column to be 0), and A15..A16 is the Criterion range:

Rapid lists. Rapid labels.



CALLIGRAPHERS GUILD OF AMERICA

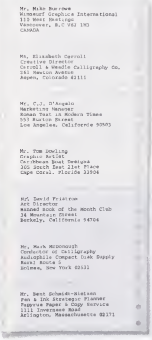
Time We'll Save With RapidFile per Month

Sorted and Totaled by Department

Department	Task	Hours Saved
Accounting	Accounts Receivable & Dunning Letters	81
	Cash receipts	18
	Invoicing	65
	**Total Hours Saved for Accounting	164
Administration	Non-profit contributions	21
	Personnel files	125
	Pre-Printed forms - Deluxe Computer Forms	335
	Rotary card file	15
	**Total Hours Saved for Administration	496
Operations	Cost estimation	245
	Job cost tracking	287
	Safety/accident history	24
	Vehicle fleet management	19
	**Total Hours Saved for Operations	575
Sales	Client file	87
	Convention registration	165
	Expense reports	127
	Form letters (mail merge)	345
	Mailing labels - Avery Laser labels	418
	Mailing labels - pin fed	423
	Price quotation	142
	**Total Hours Saved for Sales	1,707
	**Total Hours Saved for Our Company	2,942

This Report Created Using RapidFile

Page 1



Mr. Mike Burrowe
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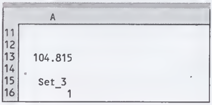
@DAVG(A3..E10,4,A15..A16)

This formula returns the correct answer and ignores any cell that contains 0 or has a negative value.

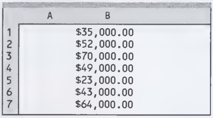


```
        A
11
12
13  104.815
14
15   Set_3
16       1
```

SYMPHONY

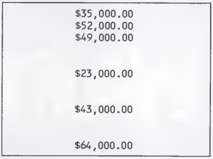
NONPRINTING LINES

Q. In order to print a column of numbers but eliminate row 3 from a report, I moved the data in column A to column B and entered a split vertical bar in cell A3. My spreadsheet looked like the one shown in figure 1 (the split vertical bar in cell A3 doesn't show). I identified my print range as A1..B7. Figure 2 shows the printed report. As you can see, I prevented row 3 from printing, but everything from row 4 down was printed with triple spacing. I use an Epson FX-80. Any suggestions?



```
      A            B
1             $35,000.00
2             $52,000.00
3             $70,000.00
4             $49,000.00
5             $23,000.00
6             $43,000.00
7             $64,000.00
```

FIGURE 1



```
              $35,000.00
              $52,000.00
              $49,000.00


              $23,000.00


              $43,000.00


              $64,000.00
```

FIGURE 2

Edmund Mitchels
Atkinson, N.H.

A. If you insert *two* split vertical bars in cell A3 of your example, the report will be printed with single spacing throughout. ■

This material is prepared by the Technical Editors, with the help of Lotus Product Support.

NOTICE: TOWN MEETING

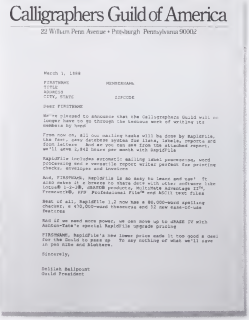
Send us your Q&As

You're invited to participate in the *LOTUS* Town Meeting issue that will be published later this year. To take part, send us your favorite Q&As about using *1-2-3* or *Symphony*. We'll print as many as space allows, so jog your memory and tell us which Q&As you found most useful and why.

To share your favorite Q&As with the rest of the *LOTUS* community, we need your response by August 1st, so get cracking! We'll acknowledge all the items we receive, but we cannot return unused material. Send your favorite Q&As today to:

LOTUS Town Meeting
c/o Q&A
P.O. Box 9123
Cambridge, MA 02139-9123

Rapid letters. Rapid File.



Calligraphers Guild of America
22 William Penn Avenue • Pittsburgh Pennsylvania 90002

March 1, 1988

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TITLE
ADDRESS
CITY, STATE ZIPCODE

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CREATING RECURRING CHARTS FROM YOUR WORKSHEET

An introduction to *Harvard Graphics*

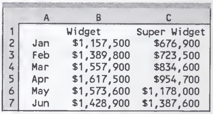
BY WILLIAM G. SAUNDERS

If you periodically update an existing set of graphs with new data from a worksheet, a new kind of graphics program can save you time. In *Harvard Graphics* and *Lotus Graphwriter II*, once you've defined a given chart, you can produce updated versions of it merely by pressing a few keys. This month's Graphics column explores Software Publishing Corp.'s *Harvard Graphics*; in the next Graphics column, we'll look at Lotus Development Corp.'s *Graphwriter II*.

To look at two techniques for automating the graph-production process, we'll first create templates that are linked to your worksheet and that are then automatically updated with any new data. Next we'll use the *Harvard Graphics* macro capability to place the graphs on the same page. You can combine these two methods to produce a large number of graphs quickly.

William G. Saunders is a computer-graphics consultant and frequent contributor to this column.

Begin by preparing the following worksheet. Before you enter the labels and values shown, select /Worksheet Global Format Currency (in *Symphony*, MENU Settings Format Currency) and specify zero decimal places (in *Symphony*, then select Quit). Then set the width of column A to 6. With the cell pointer in column A, select /Worksheet Column Set-Width (in *Symphony*, MENU Width Set) and enter 6. Repeat these steps to set the width of columns B and C to 12.

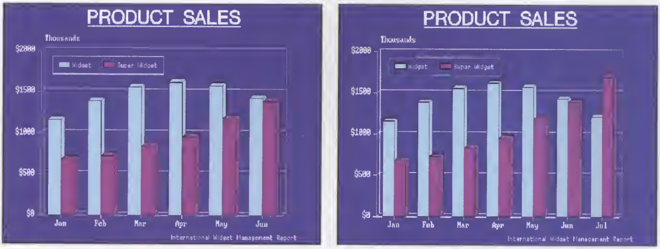


	A	B	C
1		Widget	Super Widget
2	Jan	$1,157,500	$676,900
3	Feb	$1,389,800	$723,500
4	Mar	$1,557,900	$834,600
5	Apr	$1,617,500	$954,700
6	May	$1,573,600	$1,178,000
7	Jun	$1,428,900	$1,387,600

To graph this data in *1-2-3*, select /Graph Type Bar and specify the X range as A2..A7, the A range as B2..B7, and the B range as C2..C7. Now select Options Legend A and enter *Widget*, select Legend B and enter *Super Widget*, then select Quit. Select View to view the graph, then press any key to return to the Graph menu. Save the graph settings by selecting Name Create and entering the graph name WIDGET. Now select Quit, save the worksheet under the file name SALES, and select /Quit Yes to exit from *1-2-3*.

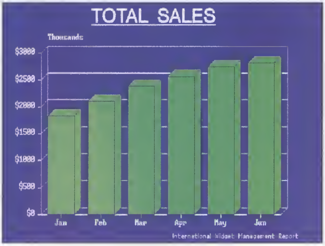
In *Symphony* select MENU Graph 1st-Settings Type Bar Range, specify the X, A, and B ranges as above, and select Quit. Select Legend A and enter *Widget*, select B and enter *Super Widget*, then select Quit Quit Preview to view the graph. Press any key to return to the Graph menu, then save the graph settings by selecting 1st-Settings Name Create and entering the graph name WIDGET. Finally, select Quit Quit, save the worksheet under the file name SALES, and select SERVICES Exit Yes to exit from *Symphony*.

To use *Harvard Graphics*, you must first install it on a hard disk. However,



***Harvard Graphics* is one of several programs that can import data directly from your worksheet, but it is one of only two that require just a few keystrokes to reread your worksheets and update those charts (note the July data added to the graph on the right).**

← CIRCLE 124 ON READER SERVICE CARD



***Harvard Graphics* can produce a wide variety of graph types, print multiple graphs on the same page, and manipulate data from within the program. The data for each of the two products graphed in the first Product Sales chart were combined to create this chart.**

you cannot load both it and *1-2-3* or *Symphony* into RAM simultaneously because even with 640K, there isn't enough memory. To load *Harvard Graphics* (with its macro processor), first enter *macro* at the DOS prompt in the directory that contains the program, then enter *hg*. The *Harvard Graphics* main menu appears in a window at the left of your screen. To select an option from any menu, either move the highlight to the option (with the Arrow keys or the Spacebar) and press Return or enter the number of the option. (On a monochrome system an arrow appears next to the number of your choice and a dashed line appears above the associated text.) You'll notice an annotated list of function keys at the bottom of the screen. Since those key assignments change depending on the part of the program you're using, consult this portion of the screen to keep current with their functions.

Harvard Graphics offers two connections to *1-2-3* and *Symphony*. You can import either named graphs stored in a worksheet file or specified ranges from which you'll create a graph. *Harvard Graphics* can also import ASCII files and export files to *Lotus Freelance Plus* and *Lotus Manuscript*.

Let's begin by importing the bar graph of product sales created earlier. Select Import/Export (5) from the *Harvard Graphics* main menu. Select Import Lotus Graph (1) from the new menu that overlaps the main menu. If you were importing data from a named range or specifying a range via cell addresses, you'd select Import Lotus Data (2).

The resulting screen, headed *Select Worksheet*, lists all the worksheets in the Import directory specified under Setup (9) Defaults (1). If you need to change the default directory, enter a new directory name. When you select the worksheet named SALES, a screen headed *Import Lotus Graph* appears. Select the graph named WIDGET, then make sure the Import Data Only option is set to No. If it isn't, change the setting by using the Arrow keys or the Spacebar to move the highlight (on a monochrome system, an arrow appears) to No. Now press the F10 key. The program enters the data from the named graph into the *Harvard Graphics* chart form, and the chart appears on the screen.

Compared with *1-2-3*'s display of the chart, the *Harvard Graphics* version exhibits some subtle differences. For example, the Y-axis label is horizontal at the top of the chart rather than vertical at the side of the chart, and there is some space between the bars and the left and right axis lines.

MODIFYING THE CHART

We'll use this chart to explore some of the modifications you can make. Press any key to return to the main menu, then select Enter/Edit Chart (2). The resulting screen, headed *Bar/Line Chart Data*, allows you to edit the raw data. In this case, the data is fine; it's the chart's appearance you want to change, so press the F8 key to bring up the Bar/Line Chart Titles & Options menu.

There are four screens (pages) of bar-chart and line-chart options. Each page is numbered at the top of the screen. Use the PageUp and PageDown keys to move between pages. The Tab key moves you to the next item on a page, and Shift-Tab moves you to the previous item. You can view changes you make at any time by pressing the F2 key.

Let's begin by adding some text. On the first page of the Options menu, type *PRODUCT SALES* on the Title line, then press Tab twice to move the cursor to the Footnote line and type *International Widget Management Report*. The default location for a footnote is at the bottom-left of the chart, but you decide to move the footnote to the right and, while you're at it, to underline the title.

To underline the title, first press Home to return the cursor to the first character of the title. Then press the F5 key to change text attributes. Notice that a window containing the attribute options appears at the bottom of the screen. Press the Tab key until the Underline option is highlighted (on a monochrome monitor, until the blinking cursor appears one space to the left of the option name), then press the Spacebar to select that option. Use the RightArrow key to expand the highlight to cover the entire title.

Press F10 to continue, then press F7 to bring up the menu for text size and placement. This menu appears to the left of the text area, with each option adjacent to the chart element it controls. Press the Tab key seven times to tab down to the Footnote line, then use the Spacebar to shift the marker in the *Place* column to R to move the footnote to the right.

Press F10, then press PageDown to move to page 2 of the Options menu. We will change only a few settings in this demonstration, but take this opportunity to look over the available options. Press Tab to move to the Bar Enhancement line, and use the Spacebar to select 3D.

Let's also move the legend from the bottom of the chart to within the chart frame. Press the Tab key 10 times to move to the block of Legend settings at the bottom of the page. Set Legend Location to Top, set Legend Justify to ← or ↑, set Legend Placement to In, and set Legend Frame to Single. Press the Page Down key.

On page 3 of the Options menu, press Tab once, select the dollar sign for the Y1-axis labels, press Tab three times, and select solid lines for the Y1 grid. To view the chart, press F2. To see

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Lotus Symphony 2.0

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how your handiwork appears on paper, press the Escape key twice, then select Produce Output (6). Select the proper output device and, if necessary, adjust the print settings. Press F10 to begin printing.

Once you've printed the graph, save it to disk by selecting Get/Save/Remove (4) and then selecting Save Chart (2). Name the chart WIDGET. Notice that the program chooses the chart's title (*PRODUCT SALES*) as a description. You can accept this description or change it. The chart description simply makes it easier to locate a particular chart from among a list of file names. When you're happy with the description, press Return.

PRODUCING THE TEMPLATE

While it hasn't taken long to modify this chart, it's not the kind of thing you want to do every month for a large number of charts. To produce this same graph every month with current data, you must save it as a template linked to your worksheet. To do so, select Save Template (4) and assign the name WIDGET (the program saves charts with a .CHT extension and saves templates with a .TPL extension, so you can use the same name for both chart and template). Now set the Clear Values option to Yes, set the Import Data option to Lotus, and press Return.

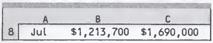
Let's create one more template and then use the two templates to update the charts automatically. You can use the *Harvard Graphics* Calculate mode to create the new template from your existing worksheet data. You need to recall the WIDGET chart because *Harvard Graphics* erased the data when you saved WIDGET as a template. Select Get Chart (1) and specify the chart named WIDGET.

When the chart appears, press any key to bring up the Bar/Line Chart Data screen, press Home to move the cursor to the title, then change the title to *TOTAL SALES*. Then press Tab six times until you get to the column headed *Series 3*, then press F4 to select Calculate mode, which allows you to perform various calculations on your data. Enter *Total Sales* on the Legend line and type *@sum* on the Calculation line. When you press F10, the program adds the numbers in columns 1 and 2 and enters the result in column 3.

Now press F8 to recall the Options menu, and press Tab nine times until you get to the *Display* column. Because you want to chart only the total-sales data, change the setting for rows 1 and 2 of this column to No by pressing the Spacebar. On page 2 of the Options menu, change the Legend Location option to None. Press F2 to view the TOTAL SALES chart, then press Escape twice to return to the main menu. Following the steps outlined previously, save the new version as both a chart and a template with the name TOTAL and the description *TOTAL SALES*.

A TEMPLATE LINKED TO YOUR WORKSHEET CAN PRODUCE THE SAME GRAPH EVERY MONTH—WITH NEW DATA.

To test how well your charts interact with your worksheet, add some new data to your original worksheet. Exit from *Harvard Graphics* and reload *1-2-3* or *Symphony*. Retrieve the file named SALES, and add the following row of July data to your worksheet:



	A	B	C
8	Jul	$1,213,700	$1,690,000

In the Graph menu, extend the X range to include cell A8, extend the A range to include cell B8, and extend the B range to include cell C8. (In *Symphony* you have to cancel the ranges and then respecify them.) Resave the graph settings under the graph name WIDGET, and resave the worksheet under the file name SALES. Now exit from *1-2-3* or *Symphony* and reload *Harvard Graphics*. If you select Get/Save/Remove (4), then select Get Template (3), and specify WIDGET or TOTAL, you'll see that the charts have been updated with the July sales.

Rather than retrieving and printing each template individually, you can use the *Harvard Graphics* Slide Show option to set up a batch-printing file to create and print all the new charts. The Slide Show option gets its name from its ability to create on-screen slide shows. While we won't deal with this feature in this article, you may want to explore it on your own.

From the main menu, select Slide Show Menu (7) Create Slide Show (1), name the file REPORT, and enter the description *Monthly Sales Report*. You can include both chart (CHT) and template (TPL) files in your batch-printing list. Chart files are printed as stored; template files extract data from your worksheet and create an updated chart.

When you select Create Slide Show, the screen divides into two windows. The upper window contains a list of files. Use the Arrow keys to move through the list, and press Return to select a file and place it into the numbered slide-show list in the lower window. Select the files WIDGET.CHT, TOTAL.CHT, WIDGET.TPL, and TOTAL.TPL, then press F10 to continue.

Press Escape to return to the main menu, then select Produce Output (6). Depending on your output device, select either Print Slide Show (5), Plot Slide Show (6), or Record Slide Show (7) and enter the print settings for your system. When you press F10, the program prints the two stored charts with data through June and uses the templates to create new charts containing July data. No further commands are needed as long as you have a printer, plotter, or camera with an automatic feed.

AUTOMATING THE UPDATING PROCESS

Sometimes you cannot update your charts simply by using templates. For example, *Harvard Graphics* does not allow you to update multiple charts from a template. At this point you need to turn to the *Harvard Graphics* macro feature to record the instructions for updating your charts every month. (In fact, the macro program, which you earlier loaded with the word *macro*, can automate keystrokes in other programs; it isn't specific to *Harvard Graphics*.)

Hold down the Alt key and press 0 to display the Macro menu. Select Record a Macro, and assign the name *multi* to the macro. From this moment on, the program will record any keystrokes you make, including incorrect ones, so take the next steps carefully. When recording a macro, specify a file by typing its name rather than by moving the cursor. If you use cursor movements and the list of files later changes, the macro may select the wrong file. Likewise, select menu options by typing the option number rather than by using the Arrow keys to move the highlight.

Begin by pressing Escape five or six times so that when you later run the macro, it automatically returns to the main menu, no matter what menu you're in when you run it. Select Get/Save/Remove (4) and Get Template (3), type *total*, and press Return twice. (At this point, the program is using the template to update the chart with the latest data from your worksheet.)

Press Escape twice to return to the main menu, then select Get/Save/Remove (4) and Save Chart (2). Press Delete eight times to delete any file name that may exist, type *total*, and press Return three times.

Now recall the second template: Select Get Template (3), type *widget*, press Return, and press Escape twice. Save the new chart: Select Get/Save/Remove (4) Save Chart (2), press Delete eight times, type *widget*, press Return three times, then press Escape.

To create the multiple chart, select Create New Chart (1) Multiple Charts (7) Two (2), then specify TOTAL.CHT and WIDGET.CHT and press F10. To print the chart, select Produce Output (6), select the proper output device, enter any print settings required for the device you've selected, and press F10 to begin printing. After your charts have printed, stop recording your keystrokes by pressing Alt-0 (to recall the Macro menu) and selecting Stop recording macro. To run the macro, press Alt-0, then select Play back a macro and specify the macro's name.

You might like to add a timing delay so that the macro will print all your charts at night when no one else is using the equipment. To make that or any other change, edit the macro with a word processor or record it again.

The next Graphics column will cover *Lotus Graphwriter II*, another program that can read worksheet files and automatically update graphs. ■

IN BRIEF

Harvard Graphics Version 2.0. Software Publishing Corp., 1901 Landings Dr., Mountain View, CA 94039; 415-962-8910. Runs on the IBM PC, PS/2, and compatible computers with DOS 2.0 or higher. Requires a hard disk, 512K of RAM recommended; supports Hercules monochrome, IBM CGA, EGA, and VGA, and all DGIS-compatible boards. Released 8/87. $395. Not copy-protected, 90-day warranty.

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* March 10, 1987 issue, page 278

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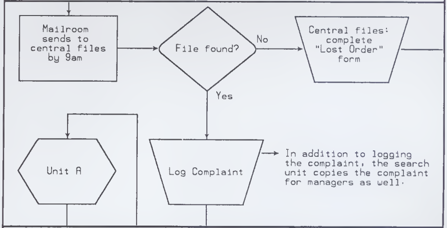
Mailroom sends to central files by 9am
File found?
No
Central files: complete "Lost Order" form
Yes
Unit A
Log Complaint
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SOFTWARE: THE WORKSHEET UTILITIES

An all-around *1-2-3* productivity enhancer

BY TOM CARLTON

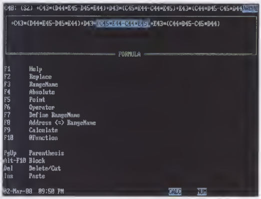
If you create and maintain worksheets, store worksheets on a hard disk, print reports with multiple print ranges, or use *1-2-3* for database management, *The Worksheet Utilities* can increase your productivity. This program consists of two *1-2-3* add-ins: one helps you with the current worksheet; the other helps you manage worksheets stored on the disk.

The first add-in, Cellworks, lets you edit formulas and labels using the entire screen rather than just the *1-2-3* control panel. Cellworks includes a facility for creating and storing print settings, an automatic-backup utility, a command to format a range of columns, and search and replace facilities that work with text, values, and formulas.

The second add-in, Fileworks, helps you manage existing worksheet files and directories. It has most of the functions for stand-alone file management, can compress worksheet files to save disk space, and can archive files so that you have a record of worksheet changes.

CELLWORKS

Cellworks' Formula Editor makes it easier to enter, edit, and debug worksheet formulas and labels. Using the full screen makes it easier to write formulas that exceed the width of the screen. The Formula Editor lets you copy, delete, and move portions of formulas, and it automatically highlights syntax errors. You can select @functions from a menu. The program will enter the @, the function name, and an open parenthesis and prompt you for the proper arguments. When you revise a formula in *1-2-3*, you can use Point mode to respecify a range only if that range specification is the rightmost argument in the formula. In Cellworks you can use Point mode anywhere in the formula.



```
C48: (S2) +C43*(D44*E45-D45*E44)+D43*(C45*E44-C44*E45)+E43*(C44*D45-C45*D44

 +C43*(D44*E45-D45*E44)+D43*(C45*E44-C44*E45)+E43*(C44*D45-C45*D44)

                              FORMULA

F1      Help
F2      Replace
F3      RangeName
F4      Absolute
F5      Point
F6      Operator
F7      Define RangeName
F8      Address <=> RangeName
F9      Calculate
F10     @Function

PgUp    Parenthesis
Alt-F10 Block
Del     Delete/Cut
Ins     Paste

02-Mar-88  09:50 PM                          CALC     NUM
```

FIGURE 1. Editing a formula with The Formula Editor.

The Formula Editor calculates each portion of the formula separately, which helps you debug and validate formulas. Its ability to highlight pairs of opposing parentheses is invaluable with complex formulas. It also has online help that clarifies the use of @functions and operators in formulas. The Formula Editor's keystroke sequence is similar to that of *1-2-3*'s EDIT key, making the editor easier to learn.

Cellworks' search and replace commands help you debug and modify spreadsheets: You can locate a specific string or formula in a large worksheet; replace some or all occurrences of a label, value, or formula; and find all cell formulas that reference a specific cell address or contain a specific @function. When maintaining a *1-2-3* database, the search and replace commands are useful in making global changes to database records.

The Print Set utility lets you display, store, and change all of your print settings on a single screen. Each collection of print settings can include specifications for the print range, headers and footers, borders, margins, and printer setup strings, and you can assign a name to each set.

Print Set maintains a library of setup strings for each printer defined in your *1-2-3* driver set. You may add your own setup strings and use the revised library with any worksheet. If you use a laser printer, you will especially appreciate this convenience.

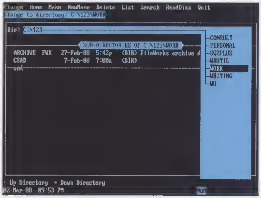
The Print Set utility lets you save your named print settings in a separate file, and each worksheet can have several sets of such named settings. For example, if you have a worksheet that includes a profit and loss statement, a cash flow statement, and a balance sheet, you can print each of these reports by selecting its named print settings and then selecting /Print Printer Go.

A third Cellworks utility, Autosave, backs up the active worksheet at specified time intervals (1 through 999 minute intervals or no Autosave at all). However, a backup cannot occur while you are using an add-in command. While the worksheet is being saved, you can continue typing characters into the keyboard buffer, but this buffer holds only 16 characters and the backup takes as long as a normal file-saving operation. Consequently, while Autosave is backing up a large worksheet, you will still have to wait before you resume typing.

The Range Column Width command lets you set the width of a range of columns with one command sequence, possibly saving you some time when you're in the process of creating a new worksheet.

Tom Carlton is the manager of corporate business analysis for CF Industries and the author of two microcomputer books.

FILEWORKS



```
Change  Home  Make  NewName  Delete  List  Search  ReadDisk  Quit
hange to directory: C:\123\WORK

Dir: C:\123------------------------------------------------
                                                           -CONSULT
 ---------------< SUB-DIRECTORIES OF C:\123\WORK >---------  -PERSONAL
  ARCHIVE  FWK   27-Feb-88  5:42p    <DIR> FileWorks archive &  -SQZPLUS
  CSAD            7-Feb-88  7:08a    <DIR>                   -WKUTIL
--end------------------------------------------------------  -WORK
                                                           -WRITING
                                                           -WU

 Up Directory  → Down Directory
02-Mar-88  09:53 PM
```

FIGURE 2. The Fileworks directory tree.

Fileworks helps you manage your *1-2-3* worksheets and any other files you may have stored on disk. It includes a file manager, and it locates files on your hard disk, compresses worksheets and other files, and saves prior versions of your worksheets.

From within *1-2-3*, the program lets you copy, move, rename, delete, and write-protect single files or groups of files. Similarly, it lets you change the current directory. The program also allows you to create, rename, and delete file directories.

With Fileworks you can attach a short description (a maximum of 240 characters) and a person's name to each file and then display that information beside the file name when you list it in the Fileworks directory. You can retrieve a file by highlighting its name or by creating a query using the file name or a keyword from the file description as a criterion. You can sort the display of your file names according to a single criterion, such as file name, file extension, file size, or date of creation. Fileworks can also search through hard-disk subdirectories to locate a file by its name or by any string of text it contains.

As you save your worksheets, Fileworks can compress them to an average of ½ to ⅓ their normal size. Compared with *Sqz! Plus* (Turner-Hall Publishing, Cupertino, Calif.), whose file-compression facility you must turn off to read noncompressed worksheets, Fileworks is more flexible. It can read both normal files and compressed files without manual intervention. Fileworks can compress both worksheet and nonworksheet files, while *Sqz! Plus* can compress only worksheet files.

Offsetting those advantages are some drawbacks. The Fileworks save and retrieve commands are separate from the *1-2-3* File commands, making them less convenient to use than *Sqz! Plus*'s integrated approach. There is no way to use *1-2-3*'s File Combine or File Xtract command with a file that was compressed using Fileworks, while files compressed with *Sqz! Plus* present no such problems.

On representative samples of several worksheets, Fileworks compressed files an average of 60%, compared with 59% and 67% for *Sqz! Plus* in minimum-compression and maximum-compression modes, respectively. Fileworks is more effective than *Sqz! Plus* at compressing worksheets that contain primarily text—such as a database. However, you can't have them both—Fileworks won't run with *Sqz! Plus.*

File Archiving lets you save past versions of a worksheet. This is a helpful feature when you're developing a new worksheet that is based on an earlier version or when you're posting a single worksheet periodically and you want to keep a record of all previous versions. For example, you might archive each month's financial-reporting worksheet.

Although some of *The Worksheet Utilities*' functions are useful only on a computer with a hard disk, most of the program's functions can also be used on a PC with two floppy-disk drives. Cellworks never uses more than 70K of memory because the utilities reuse the same memory when they are swapped back and forth. Fileworks uses 100K of memory. ■

IN BRIEF

The Worksheet Utilities Version 1.0. Funk Software, 222 Third St., Cambridge, MA 02142; 617-497-6339. Comes with both 3½-inch and 5¼-inch disks. Runs on IBM PC, PC XT, PC AT, PS/2, and compatible computers. Requires *1-2-3* Release 2 or 2.01 and DOS 2.0 or higher. Cellworks occupies a maximum of 70K of RAM or expanded memory. Fileworks occupies 100K of RAM. $99.95. Released 1/88. Not copy-protected; 90-day warranty on disk.

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CIRCLE 127 ON READER SERVICE CARD

SOFTWARE: NOTE-IT PLUS, NOTEWORTHY, AND SMARTNOTES

Note-taking software provides a tidy way to annotate worksheets.

BY ROBIN RASKIN

Most worksheets can't answer such questions as "Are those numbers seasonally adjusted?" and "Why is the forecast so high?" In a manually created report, footnotes can supply that information, but not in a worksheet. Instead, you can use note-taking software. When you activate a note-taking program while using *1-2-3*, a temporary window appears (over your worksheet) in which you can document underlying assumptions, clarify formulas, cite sources, and define relationships. The note then attaches itself to the current cell so that you can redisplay it at your whim.

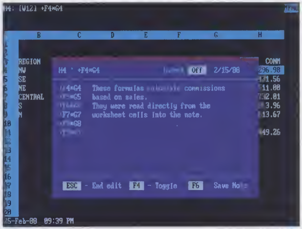
We reviewed three note-taking programs: *Note-It Plus*, *Noteworthy*, and *SmartNotes*. They are all inexpensive, easy to use, and worth the RAM they require. Only *SmartNotes* won't lose track of a note after you sort the range containing the cell it's associated with, but it will do so only if you restrict your use of the program to a limited mode. If you want to create pop-up notes for all of your applications and DOS files, *SmartNotes* is the right program. *SmartNotes* is a terminate-and-stay-resident program, whereas *Note-It Plus* and *Noteworthy* are add-ins for *1-2-3*, so installation, deinstallation, note storage, and note retrieval are in some ways better integrated with the worksheet. Between the two add-ins, *Noteworthy*'s ability to import text and its greater text-storage capacity give it the edge if you write longer notes. *Note-It Plus* is less sophisticated, but because it has fewer options, it's easier to learn.

NOTE-IT PLUS

Note-It Plus is so easy to use that you probably won't read most of the manual. The program is perfect for short

---

Based in New York City, Robin Raskin is a free-lance writer, editor, and consultant.

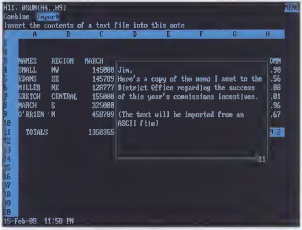


```
H4: [W12] +F4*G4

        B         C        D        E        F        G        H

  REGION                                                     COMM
  NW        H4 ' +F4*G4                    Off   2/15/88   296.98
5 SE                                                         1.56
6 NE           4*G4   These formulas          commissions   11.00
  CENTRAL        *G5   based on sales.                       2.01
  S                    They were read directly from the      3.96
  N            F7*G7   worksheet cells into the note.       13.67
10               *G8
                                                            49.26
13
14
16
18
20      ESC - End edit   F4 - Toggle   F6   Save No
25-Feb-88  09:39 PM
```

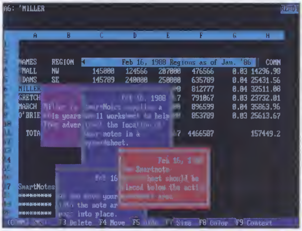
The cell notes in *Note-It Plus* cannot be sized or positioned, but you can toggle from the note to the underlying spreadsheet.



```
H11. @SUM(H4..H9)
Combine  Import
Insert the contents of a text file into this note
       A        B        C        D        E        F        G        H

  NAMES    REGION   MARCH                                         OMN
  SMALL    NW        145000 Jim,                                  .90
  EDANS    SE        145789 Here's a copy of the memo I sent to the .56
  MILLER   NE        128777 District Office regarding the success  .08
  GRETCH   CENTRAL   155000 of this year's commissions incentives.  .01
  MARCH    S         325000                                        .96
  O'BRIEN  N         458789 (The text will be imported from an     .67
10                          ASCII file)
11  TOTALS          1358355                                       9.2
                                                              11
14
16
18
20
15-Feb-88  11:58 PM
```

Noteworthy imports ASCII text files directly into the note window. If you're likely to attach large documents to a cell, you'll relish this feature.



```
A6: 'MILLER

       A        B        C        D        E        F        G        H

  NAMES    REGION   Feb 16, 1988 Regions as of Jan. '86              COMM
  SMALL    NW        145000   124566   207000   476566     0.03 14296.98
  DANS     SE        145789   240000   250000   635789     0.04 25431.56
  MILLER                                        812777     0.04 32511.08
  GRETCH                     1988             7 791067     0.03 23732.01
  MARCH                                         896599     0.04 35863.96
  O'BRIE   is years      11 workshe     help    853789     0.03 25613.67
                adver      the loca
  TOTA                 notes in a             7 4466587         157449.2
                          sheet.
                                       Feb 16, 1
                                        Smartnote
                         16              heet should be
17 SmartNotes                         laced below the acti
   *********           your
   *********           the note ar
   *********           into place.
      3 Delete  F4 Move  F5        Size  F8 Color  F9 Context
```

SmartNotes can annotate almost any software you run. It offers a potpourri of options, including the ability to select the color of a note window, its size, and its position on the screen.

notes, but if you create lengthier notes, you may feel constrained by the program's note-size limitations, awkward editor, and inability to resize or move the window containing the note.

Note-It Plus creates two types of notes—file notes and cell notes. A file note is a one-per-file summary note, while a cell note is a note you attach to a cell, typically to describe its contents.

A file note includes the date, time, and worksheet size, which it updates each time you save the worksheet. (A file note is stored in a separate note file, and if you rename the worksheet, you must rename the file note.)

Cell notes are limited to 500 characters (about 75 words) each and to 250 such notes per worksheet. To compensate for the limit on the number of characters per note and to provide a means to view notes as a series, *Note-It Plus* lets you link notes. A note attached to one cell can be linked to another note and the two can be viewed consecutively. Linked notes are especially useful for a presentation; you can call up the notes in a predefined sequence as you present your spreadsheet. However, linked notes are somewhat awkward to use.

One way to find a note you've saved is to search for a string of text in any note or in any cell of the current worksheet. You can also see the location of your notes by having the program highlight all cells with notes. Furthermore, you can extend the search to any note (or cell) in any worksheet on the disk and import what you find without ever retrieving the worksheet that contains the note.

You can apply that facility to search formulas as well. So in a worksheet that doesn't store variables in cells separate from the formula, you might use it to locate formulas that contain a given variable. Ironically, there is no replace function—possibly because Turner Hall markets another product, *Spellin!*, that contains a replace feature (but it's asking a lot to require you to buy two products in order to unite these naturally paired features).

Note-It Plus enables you to print your notes in a variety of ways. You can print a single note, a note with its underlying worksheet screen, a list of all cells that contain notes, or all notes attached to a worksheet. You can also cut and paste among worksheets and notes (for example, you might want to transfer the text of a formula into the note instead of rewriting it), but the method for doing so is confusing—the cut and paste options appear on separate menus.

To review the contents of your notes, you may browse backward or forward for the next note, browse from one linked note to another, or simply move your cell pointer from cell to cell in search of attached notes. It's in this latter mode that the linked notes may disconcert you. You might encounter a cell with a symbol telling you it has a note attached. Only upon displaying it will you discover that the note does not pertain to the current cell but to some other cell.

Because *Note-It Plus* emulates *WordStar*, invoking commands in *Note-It Plus*'s editor requires more keystrokes than in most word processors. Another drawback to these commands is their inability to resize or reposition a note on the screen. You can toggle between the note and the underlying spreadsheet, but that's not as helpful as moving the window or sizing it to uncover an important cell entry.

NOTEWORTHY

Of the three packages reviewed, *Noteworthy* offers the most control over the creation, presentation, and tracking of your notes. You can size and position the notes on the display screen. A note can contain as many as 8,000 characters (about 1,150 words), and you can scroll vertically through the text in a note window. *Noteworthy*'s ability to import ASCII text lets you bring large chunks of text directly into the note window, and its ability to copy text between worksheet and note reduces the likelihood of errors.

A variety of options enables you to customize your work. You can display nonprinting characters (such as tabs, spaces, and carriage returns) to help format text or simple tables. You can

FEATURES	NOTE-IT PLUS	NOTEWORTHY	SMARTNOTES
Programs supported	*1-2-3* Rel. 2/2.01	*1-2-3* Rel. 2/2.01, *Symphony*	Most PC software except games and graphics-based software
Support for expanded or extended memory	No	Expanded	No
Maximum size of note	500 characters	8,000 characters	230 characters
Maximum number of notes per file	250	Unlimited	125
Can link notes	Yes	No	No, but multiple notes attached to 1 cell
Can assign colors to notes	No	No	Yes
Can size notes	No	Yes	Yes
Can position notes on screen	No	Yes	Yes
Can browse notes	Yes	Yes	Yes
Note-edit features:			
Search through notes	Yes	Yes	No
Search through worksheet	Yes	No	Yes, with *SmartNotes* utilities
Replace	No	Yes	No
Move blocks	Yes	Yes	No
Copy, move, delete text	Yes	Yes	No
Import text	No	Yes	No
Transfer from worksheet to note	Yes	Yes	Yes
Print notes	Yes	Yes	Yes
Print cells with accompanying notes	Yes	Yes	Yes
Supports *1-2-3* macros	No	Yes	No
Context-sensitive help	Yes	Yes	Yes

also designate the amount of RAM (16K or more) the program will use to store notes. If you allocate a larger amount of RAM and subsequently save many notes, *Noteworthy* retrieves them more speedily than if you specify a smaller amount of RAM. Once you've finished annotating a worksheet, you can protect your notes against accidental keystrokes. *Noteworthy* can also combine notes from a saved worksheet into the present worksheet, which is useful if you create more than one version of the same worksheet.

However, all the extra functionality isn't particularly well presented. To begin with, the opening function-key-activated menu differs from *1-2-3*'s highlighting menu. Some menu items seem poorly placed, and the Copy command appears three times: once for copying text from inside a block to elsewhere inside the block, once for copying from a block to a Paste Buffer, and once to copy an entire note to another location. One Copy command to perform all three functions would be simpler.

Noteworthy is in other ways quite easy to use. The program automatically alerts you to the presence of a note in the current cell (whereas you must instruct *Note-It Plus* to show you cells with associated notes). Two methods give you access to an entire worksheet's notes: A Note List summarizes all notes in the worksheet, and a Note Map highlights every cell with a note in it.

Noteworthy can not only search through the current note or through all notes in the worksheet, it can replace them as well. However, it can do those things only within a note, so you can't search the worksheet contents, and there is no equivalent of the *Note-It Plus* helpful File Notes nor a way to link notes.

Noteworthy's editor is better than the editor in *Note-It Plus* or *SmartNotes*. It reformats paragraphs automatically, and both insert and overstrike typing modes are available. There is a full set of fairly traditional cursor-movement commands, although there are no commands for deleting text in ways other than character by character or as a marked block. You can print a single note, all the notes in a worksheet, or a list of notes, but you cannot print a note with the corresponding worksheet area. Unlike *Note-It Plus, Noteworthy* works with *Symphony*.

SMARTNOTES

With *SmartNotes* you can annotate almost anything that appears on your screen—including file names in a directory, or any other portion of the screen containing a directory listing, and even data stored in *1-2-3* add-in programs (such as a database manager).

In DOS or any application program besides *1-2-3*, *SmartNotes* "glues" a note to a location by associating the note with a series of the characters that location contains. However, in *1-2-3* you want *SmartNotes* to associate the note with a specific cell, not merely a location on the screen. To use *SmartNotes* with *1-2-3*, you must first combine a small *SmartNotes* worksheet (of just seven cells) onto the worksheet you wish to annotate. Compared with the other programs, that's an extra step, albeit a simple one. You must be careful using this scheme; if during your subsequent work you accidentally change any of the seven combined entries, your notes will come unglued from the cells they are supposed to annotate.

SmartNotes does not claim to include word-processing features. There's no search or replace facility, few text-editing commands (it has no overstrike mode or block move commands), and you cannot import text from other files. *SmartNotes* does offer many ways to define how and when a note will pop up and how that note will look. *SmartNotes*' default mode displays any notes associated with cells on the current screen. That can create a very cluttered display, so you can opt to display an arrowhead pointing to a note location or you can highlight the location.

Because *SmartNotes* enables you to save more than one note file for a given worksheet, you can use alternate note files for different kinds of notes (perhaps one set for a presentation and another for technically documenting the worksheet). Or if you have a color monitor, you can differentiate your notes by saving them in a variety of colors within the same worksheet. Notes also come in three sizes. A single-line note is particularly effective for saving a synopsis of a file's contents; larger note sizes accommodate lengthier text. You can move a note anywhere on the screen, hide notes from view, and attach several notes to a cell.

SmartNotes lacks some of the conveniences you'll expect. For example, if you select the Print command, you can print only the current note. To print more than one, you must first choose the Display Notes option and mark the notes for printing. If you want to print *1-2-3* notes with their corresponding cell addresses, you must run the accompanying *SmartNotes* Utility program. Consolidating all such printing options beneath a single Print command would be a big improvement. (The *SmartNotes* Utility also converts files from old *SmartNotes* versions, conducts file-name searches, and recovers lost notes, but the utility contains no menus; you must run it from the DOS prompt.)

If you opt to keep *SmartNotes* in text-matching mode (as opposed to the mode in which it matches notes with specific cells), there are two instances where *SmartNotes* provides powerful capabilities. You can sort cells with attached notes without losing track of the note (none of the other programs can do that). You can also instruct the note to be displayed only when a certain value appears in that cell (to remind you

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to do something when that value appears) or to display a table of entries when a certain label appears. You can run the program in both modes simultaneously, but in doing so, you lose the ability to create new notes.

Viewing *SmartNotes* can be chaotic, because each time your screen changes, all of the notes attached to locations on the new screen appear in their entirety. To manage things better, you can hide a note from view, and when note areas overlap, you can specify one to be displayed in the forefront. You can also either disable the automatic pop-up feature entirely or use it to display only a single line of the note. You'll probably need to use the program awhile before determining which is best for you.

Finally, *SmartNotes* is a boon to anyone who needs access to small amounts of reference information while using a worksheet. If you use a particular payment schedule, a weights and measurements table, or even the periodic table, you can put that table into a note (although you cannot make a cell reference to it). Because you can associate the same *SmartNotes* file with the different spreadsheets, you can attach that note to multiple worksheets. ■

IN BRIEF

Note-It Plus Version 1.0. Turner Hall Publishing, 10201 Torre Ave., Cupertino, CA 95014; 408-253-9600. Runs on the IBM PC XT, PC AT, and compatibles. Requires DOS 2.0 or higher and occupies 70K of RAM. Released 7/87. $79.95; upgrades, $25. Not copy-protected; 30-day, money-back guarantee that product performs as manual promises; 90-day warranty for disk.

Noteworthy Version 1. Funk Software, 222 Third St., Cambridge, MA 02142; 800-822-3865, in Mass. 617-497-6339. Runs on the IBM PC, PC XT, PC AT, and PS/2. Requires DOS 2.0 or higher and occupies 50K of RAM. Released 4/87. Not copy-protected; 90-day replacement of defective media.

SmartNotes Version 2.0. Personics Corp., 2352 Main St., Bldg. Two, Concord, MA 01742; 800-445-3311, in Mass. 617-897-1575. Runs on the IBM PC, PC XT, PC AT, PS/2, and compatibles. Requires DOS 2.0 or higher and two floppy-disk drives or one floppy-disk and one hard-disk drive. Occupies 85K of RAM. Released 7/87. $79.95 (upgrades free for packages purchased after 1/1/87). Not copy-protected; 90-day warranty for defective disks.

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SOFTWARE: @FUNCTIONS#1

Timesaving new @functions for *1-2-3* and *Symphony*

BY TIM K. NGUYEN AND MARK SAKS

AMY WASSERMAN

If you can't find a *1-2-3* or *Symphony* @function to suit a particular need, *@functions#1* gives you 45 more chances to succeed. The @functions contained in this add-in for *1-2-3* Release 2 or higher and *Symphony* enhance existing @functions, such as the string functions, as well as provide entirely new capabilities, such as calendar management. They can also save you time, as can the native *1-2-3* or *Symphony* @functions, since they serve as concise substitutes for longer formulas or for macros. What *@functions#1* does not do is allow you to define your own @functions.

The @function categories in this add-in include calendar (scheduling), date and time, financial, lookup, string, logical, and special.

The calendar functions, not to be confused with *1-2-3*'s date and time functions, are entirely new. They let you specify nonworking days and then ask a variety of questions involving them. For example, one @function returns the first working day of the month, and another returns the number of working days between two specified dates. A third adds a specific number of working days to a starting date and returns the resulting date, allowing for weekends and holidays.

Date and time functions extend *1-2-3*'s and *Symphony*'s native @DATE and @TIME capabilities. For example, @DAYN returns a number representing the day of the year for a specified date, while @WEEK returns the week of the year in which a particular date falls. @WEEKDAY, which returns an integer corresponding to the day of the week, is much easier to use than the *1-2-3* or *Symphony* alternative:

@MOD(@DATE(yy,mm,dd),7)

@DATESTRING returns a string such as Tuesday, 1st March 1988. Although that date format is nonstandard, the @DATESTRING formula is nonetheless easier to write than the equivalent *1-2-3* formula. By combining this function with two others contained in *@functions#1*, you can calculate the day of the week from the date serial number (the number *1-2-3* uses to store a date).

The financial functions include a compound interest function that computes the future value of a lump-sum investment on a compound basis. That's something new, but the companion function @GROWTHRATE is just the native @RATE function with the arguments reversed. The ability to sum the beginning or end of a range with @BEGRANGE and @ENDRANGE could come in handy for computing a weighted average. Using the @PRODUCT function in place of the Data Matrix Multiply command lets you use a simpler arrangement of the data you're analyzing, and unlike the Data Matrix command, it will automatically update the value it returns if the data changes.

The lookup functions in *@functions#1* provide new ways to look up data in two-way tables. You can now use either strings or numbers as input arguments in the column and row headings, which is a more flexible technique than specifying offset values using the native @INDEX function. @EXTHLOOKUP and @EXTVLOOKUP extend the native @HLOOKUP and @VLOOKUP to other worksheets (one user consulted for this

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Tim K. Nguyen is the coauthor of Applied 1-2-3: Creating Spreadsheet Systems for Others, *published by Brady Books (1987), and Mark Saks is an associate professor of mathematics at the Community College of Philadelphia.*

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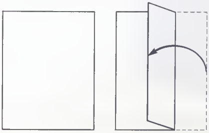

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review felt that these two functions alone made the library worth acquiring). That means you can build reference tables (such as tax and statistical tables) into separate files that can be read from any worksheet. Since you no longer have to store those tables on the worksheets that reference them, these external-reference @functions are a big step toward eliminating duplication of data. Like their near-namesakes, @EXTHLOOKUP and @EXTVLOOKUP provide only one-way lookups, but another @function can perform external lookups on two-way tables.

As with the string functions in *1-2-3* and *Symphony*, the string functions in *@functions#1* manipulate strings or return information about them. @ZERO displays a zero if a cell contains a zero, ERR, NA, a null string, or a blank; otherwise, it displays the actual contents of the cell. If you try to suppress any of those values in favor of a zero, @ZERO will simplify your work considerably. The unrelated function @ZEROES converts a value into a string padded with zeros fore and aft—a useful feature for scientific work. The function @CRDR attaches a CR (credit) or DR (debit) suffix to a value and displays it as a string with two decimal places and commas separating thousands. Unfortunately, the string is left-aligned, making it difficult to align the result with the right-aligned values in the same column. Other string functions allow you to remove all spaces and all special and numeric characters.

Two string functions bear special mention. @SPLITN returns the number of elements (words or numbers, separated by spaces) in the string being evaluated. The @SPLITF function returns the string element that you specify. @SPLITF is substantially easier to use and more flexible than the native @MID function combined with a macro because it lets you store a list of words in a single cell and extract them by number.

The logical @functions allow you not only to check whether a cell contains a string, but also to ascertain whether it is numeric, alphabetic, or alphanumeric. Other logical functions verify whether a string begins or ends with a specified string, is an odd or even number, or is a valid time or date string.

The lone special function, @FILEEXISTS, will tell you whether a file exists. You can also use this function in macros to evaluate a true or false condition and return a specific error message rather than leave you guessing what error may have occurred. @FILEEXISTS also tells you whether a file is being saved for the first time, enabling you to include or exclude the Replace command upon saving a file.

@functions#1 is organized into four libraries. The first is comprehensive and includes all the @functions, the second contains calendar and date and time @functions, the third contains string and logical @functions, and the last contains financial and special @functions. Since you can add no more than 48 @functions to *1-2-3* simultaneously, loading only the library you intend to use may leave you enough memory to load other programs that add @functions to *1-2-3*.

Once you attach *@functions#1* to *1-2-3*, you can use its new @functions just as you would use those native to *1-2-3*, and the add-in @functions seem to operate as quickly as the native ones do. Curiously, you cannot detach *@functions#1* from *1-2-3* as you can other add-ins.

In *Symphony*, the way you use the new @functions differs somewhat; you must write a special @function to specify which *@functions#1* @function you wish to use. The documentation offers almost no support to *Symphony* users, so you'll have to interpret the *1-2-3* instructions in order to modify the syntax yourself.

In general, learning to use the program isn't particularly difficult (even though a few more examples would have been helpful); it's a matter of familiarizing yourself with the syntax of each new @function. ■

IN-BRIEF

@functions#1 Version 1.0, Intex Solutions, 161 Highland Ave., Needham, MA 02194; 617-449-6222. Runs on the IBM PC, PC XT, PC AT, and compatible computers. Requires a minimum of 512K of RAM, *1-2-3* Release 2 or higher or *Symphony* Release 1 or higher, and DOS 2.0 or higher. (The library itself needs approximately 64K of standard memory in addition to the 20K required by the Add-in Manager and supports LIM-EMS expanded memory boards.) $95 plus $5 shipping. Released 12/87. Not copy-protected; 30-day warranty and defective-media replacement.

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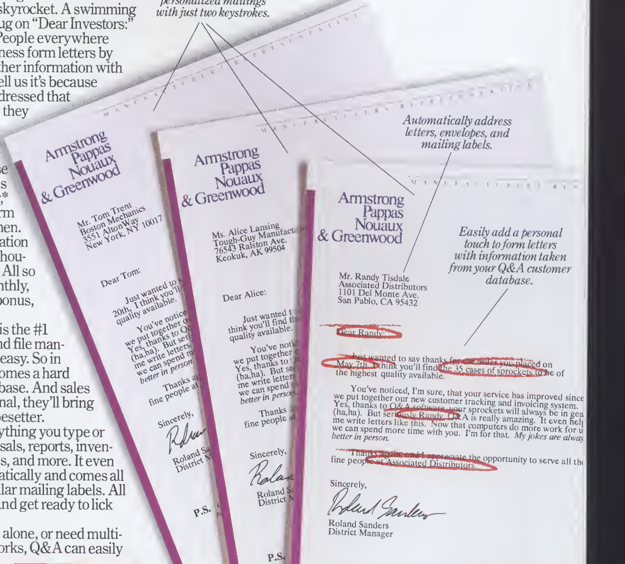

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& Greenwood

Ms. Alice Lansing
Tough-Guy Manufactu
76543 Ralston Ave.
Keokuk, AK 99504

Dear Alice:

Armstrong
Pappas
Nouaux
& Greenwood

Mr. Randy Tisdale
Associated Distributors
1101 Del Monte Ave.
San Pablo, CA 95432

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Sincerely,

Roland Sanders
District Manager

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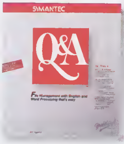
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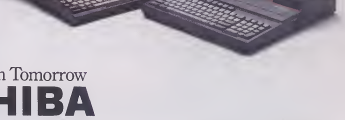

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CIRCLE 130 ON READER SERVICE CARD

NEW PRODUCTS

Polaroid Slide Maker Instantly Turns Hard Copy into Color Slides, Overheads, and Prints.

POLAROID HAS MADE A TECHNOLOGICAL LEAP WITH its Bravo! Slide Maker. If you place copy such as a computer printout, magazine illustration, or photograph on the unit's light bed (just as you would on a photocopier), the unit will produce a 3-by-4-inch overhead transparency, a 3-by-4-inch instant color print, or a medium- to high-quality 35mm slide. No other unit on the market can combine these tasks.

You can convert black-and-white sheets into blue-on-white overheads or slides using PolaBlue instant film. You can project black-and-white slides as is or use tinted gels in the slide frame to yield a color projection. The unit contains an automatically winding 35mm camera back, a pack-film camera back, and preprogrammed settings for the supported films.

For 35mm instant slides, you can use any of four types of Polaroid instant films, which you can process immediately with the supplemental motorized PowerProcessor and the slide mounter that is included with the system. You can also use conventionally processed 35mm film; Polaroid recommends its new Presentation Chrome. Transparencies can be shown as is at the 3-by-4-inch size or blown up with a commercially available magnifier that mounts on an overhead projector to achieve conventional 8-by-10-inch overhead projected images (Polaroid sells such a unit, the Buhl Overhead Adapter, for $96.50).

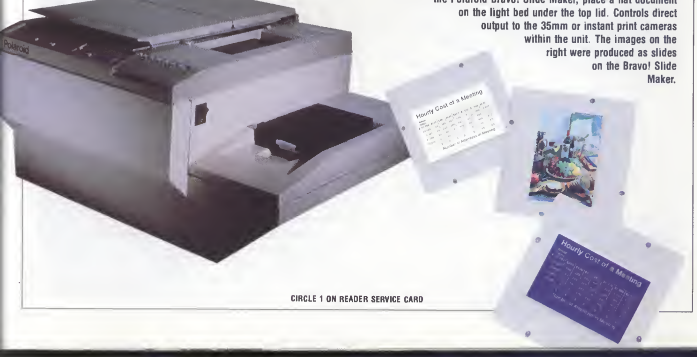
For instant prints, use Polaroid's peel-apart films. Polacolor Type 669 produces the full-color prints; Colorgraph Type 691 produces the full-color, mini overheads.

The unit weighs 27 pounds and measures 28 by 25 by 16 inches (about the size of a small desktop copier). To use it, you need not know anything about photography other than how to load film into the camera. The control panel has indicator lights that lead you through the selections and report any input errors or malfunctions.

Maintenance is allegedly minimal because the unit uses no toners, stabilizers, or other chemicals. Camera backs are easily replaceable. With this system, low-cost, high-quality presentation media can be generated as easily and quickly as a photocopy.

Polaroid Bravo! Slide Maker costs $2,595; from Polaroid, 575 Technology Sq., Cambridge, MA 02139; 1-800-343-5000. *—Dona Z. Meilach*

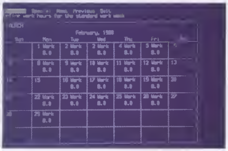
Information for New Products is supplied by the vendors and was up to date as of 5/2/88. Since product specifications change frequently, we recommend that you verify this information with a dealer before making a purchase.



To make color 35mm slides, overheads, or instant prints with the Polaroid Bravo! Slide Maker, place a flat document on the light bed under the top lid. Controls direct output to the 35mm or instant print cameras within the unit. The images on the right were produced as slides on the Bravo! Slide Maker.

CIRCLE 1 ON READER SERVICE CARD

Project-Manager Add-In Tracks Schedules and Combines Budgets in 1-2-3; Adds 30 @Functions



PROJECT CALC LETS YOU SCHEDULE ALL TASKS related to a project and create the project's related budget items on the same spreadsheet. The program lets you make PERT and Gantt charts, as well as a monthly calendar. It produces a tabular report of schedule dates, costs, and interrelated tasks. You can easily integrate a project's budget into a larger budget. The program also contains 30 new @functions.

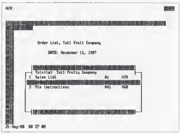
Project Calc requires *1-2-3* Release 2/2.01 and uses 140K of RAM. It costs $149.95; from Frontline Systems, P.O. Box 7408-P2, San Francisco, CA 94120; 800-451-0303, in Calif. 916-677-7171.

CIRCLE 2 ON READER SERVICE CARD

Add-In Lets You Use an Outline to Work in 1-2-3; Accesses Multiple Worksheets Simultaneously

WITH THE *MULTISHEET* ADD-IN, YOU CAN USE AN outline to design, analyze, and manipulate one or more worksheets using familiar *1-2-3* commands. You can load, save, consolidate, and recalculate entire worksheets or selected portions from the *MultiSheet* outline. The program also lets you store multiple scenarios for what-if analyses.

MultiSheet uses 24K of RAM and requires *1-2-3* Release 2/2.01, DOS 2.0 or higher, and at least 320K of RAM. It runs on the IBM PC, PC XT, PC AT, PS/2, and compatible computers. It costs $49; from RockSoft Corp., 230 California St., Suite 210, Palo Alto, CA 94306; 415-321-8090.



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A20
Order List, Tuti Fruit Company
DATE November 11, 1987
Tutorial  Tuti Fruity Company
1  Sales List                A1    H20
3  Mix Instructions          A41   H60
25-May-88  08 27 AM
```

CIRCLE 3 ON READER SERVICE CARD

1-2-3 and Symphony Add-In Automates Budgeting; Updates Values in Interdependent Accounts Automatically

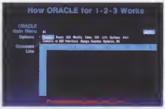
BUDGET SOLUTIONS GIVES YOU A READY-TO-USE form for creating budgets in *1-2-3* or *Symphony* worksheets. If you specify relationships among your accounts (for example, limit salaries in marketing to 7% of the budget, increase advertising by 5%, and limit general and administrative expenses to no more than 13%), the program automatically recalculates and distributes the new percentages throughout the worksheet. *Budget Solutions* will display budget variables hierarchically, that is, by showing the main budget and all the subsidiary accounts.

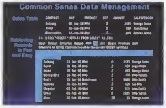
Budget Solutions requires *1-2-3* Release 2/2.01 or any release of *Symphony* and uses 100K of RAM. It costs $99.95; from Enfin Software Corp., 6920 Miramar Rd., Suite 106-A, San Diego, CA 92121; 800-922-4372, in Calif. 800-722-4372.

CIRCLE 4 ON READER SERVICE CARD

1-2-3 Add-In Provides Relational-Database Management and Access to Data in Oracle on Large Computer Systems

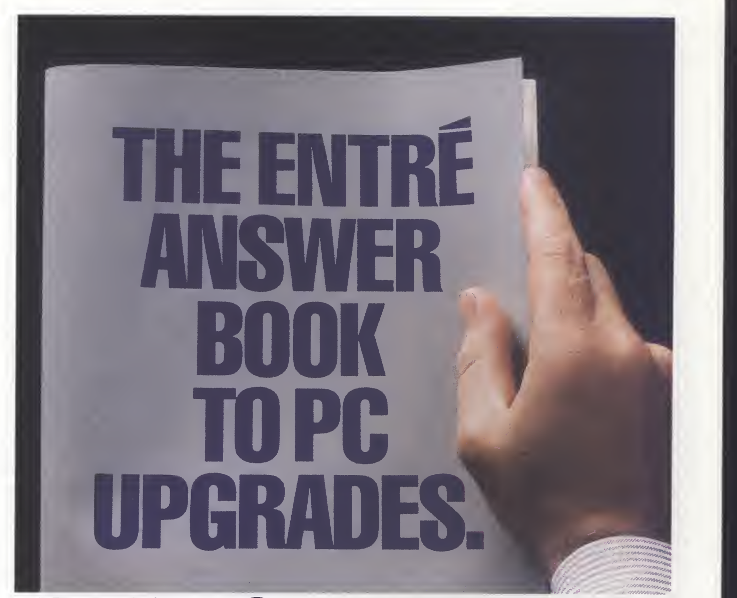
ORACLE DATABASE ADD-IN FOR LOTUS 1-2-3 lets advanced users create and manage relational databases in large or in multiple *1-2-3* worksheets. You can use either familiar *1-2-3* menus or Structured Query Language statements to locate data in your PC files or data stored in *Oracle* on mainframes.




Common Sense Data Management
Sales Table
Retrieving Records is Fast and Easy

The program runs on '286- and '386-based machines, including the IBM PC AT, PS/2 models, and the Compaq Deskpro 286 and 386. It requires *1-2-3* Release 2.01, DOS 3.0 or higher, 640K of RAM, 896K of extended memory, 5 megabytes of free hard-disk space, and a floppy-disk drive. A math coprocessor is recommended. The add-in costs $199; from Oracle Corp., 20 Davis Dr., Belmont, CA 94002; 800-672-2531.

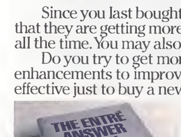
CIRCLE 5 ON READER SERVICE CARD



WHAT YOUR OLD COMPUTER SYSTEM NEEDS IS SOME NEW INFORMATION.

Since you last bought a microcomputer system, you may have noticed that they are getting more powerful, more productive and less complicated all the time. You may also have wondered how you're going to keep up.

Do you try to get more out of the system you have? Do you opt for enhancements to improve speed and memory? Or would it be more cost effective just to buy a new system?



At Entré, we understand your concerns. In fact, we've written a book about it. It explains in clear, concise English how you can make your system more productive and more efficient. And how the experts at your local Entré Computer Center can help you with products, training, service and support.

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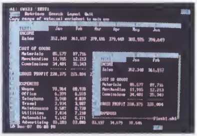
CIRCLE 131 ON READER SERVICE CARD

1-2-3 Add-In Lets You View and Update Any File on Disk from Within Your Current Worksheet

WITH *FLASH-IN* YOU CAN BRING ANY FILE ON YOUR hard or floppy disk into a window within your current worksheet to work on both simultaneously. Through the window you can search a file, replace any part of it, or combine it with the current file. The program also displays the pattern created by all the occupied cells on a worksheet so that you can see its overall composition and organization and from which you can move to any portion of the worksheet immediately.

Flash-In runs with *1-2-3* Release 2/2.01 and IBM PC or compatible computers with DOS 2.1 or higher. It costs $79.95; from PC Publishing, 1801 Avenue of the Stars, Suite 815, Los Angeles, CA 90067; 800-634-4555.



CIRCLE 6 ON READER SERVICE CARD

Utility Translates ASCII Files into 1-2-3 and Symphony Files; Creates a Ready-to-Use Worksheet from Imported Data

TRANS FOR 1-2-3 CONVERTS ASCII FILES FROM ANY popular database, word-processing, or spreadsheet package into files compatible with any release of *1-2-3* and *Symphony*. *Trans* distinguishes between labels and values and can automatically build a *1-2-3* or *Symphony* worksheet with text and numerical tables from an imported database. *Trans* can also run in batch mode so that you can convert large or multiple files overnight.

Trans for 1-2-3 runs on the IBM PC, PS/2, and compatible computers with DOS 2.0 or higher. It uses 60K of RAM; 500K of RAM is required to import the maximum-size, 1,000-line-by-500-character file. The utility costs $75; from Intex Solutions, 161 Highland Ave., Needham, MA 02194; 617-449-6222.

CURT BERNER

CIRCLE 7 ON READER SERVICE CARD

1-2-3 and Symphony Add-In Provides Fill-in-the-Blank Data Entry; Makes Business Forms, Form Letters, and Mailing Labels

D.A.V.E. (DATA ADDITION, VERIFICATION, AND EDITing) lets you set up data-entry forms that you can use in *1-2-3* and *Symphony*. You can specify validity criteria for any item (so that, for example, the numeric social security field will not accept an alpha character). The program verifies all entries, including imported data, using your criteria. The program also includes templates for accounts payable and receivable, payroll, purchase-order tracking, inventory management, and budget and sales analyses. You can also use the program to print mailing labels and form letters from your database.

D.A.V.E. requires *1-2-3* Release 2/2.01 or any release of *Symphony*, uses 60K of RAM, and runs on IBM PCs and compatibles with DOS 2.0 or higher. It costs $99.95; from Goldata Computer Services, 2 Bryn Mawr Ave., Bryn Mawr, PA 19010; 800-432-3267.

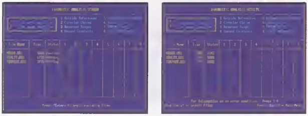
CURT BERNER

CIRCLE 8 ON READER SERVICE CARD

Free Spreadsheet-Diagnostic Utility Can Locate Errors in Your Spreadsheet

DIAGNOSTIC SPREADSHEET UTILITY, FOR USE WITH any version of *1-2-3, Symphony, The Twin,* and *Supercalc3* or *4*, is admittedly a sales-promotion tool for the manufacturer. However, the utility will search your worksheet for circular references and references to blank cells or cells outside the worksheet range, cells containing labels, and reversed ranges. It searches contiguous data to see if range names match the specified cell addresses, for cells with the value of ERR/NA, and for unreferenced values.

You must indicate which software you want the *Diagnostic Spreadsheet Utility* to work with. The disk is free; from The Mt. Whitney Group, 11612 Knott Ave., Building G19, Garden Grove, CA 92641; 800-521-6320.



CIRCLE 9 ON READER SERVICE CARD

LOTUS
COMPUTING FOR MANAGERS AND PROFESSIONALS

READER SERVICE

JULY 1988

Name ______________________ Title ______________

Company ______________________ Dept. or Mail Sta. ______________

Address ______________________

City ______________ State ______ Zip ______________

Phone ______________________

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This card expires 2/1/89

1	11	21	31	41	51	61	71	81	91	101	111	121	131	141	151	161	171	181	191	201	211	221	231	241	251	261	271	281	291
2	12	22	32	42	52	62	72	82	92	102	112	122	132	142	152	162	172	182	192	202	212	222	232	242	252	262	272	282	292
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10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300

I am a *1-2-3/Symphony:* ☐ **51** Novice ☐ **52** Intermediate ☐ **53** Expert

Comments ______________________

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RATE THE ARTICLES IN THIS ISSUE. On the page behind this card, find the list of articles under the heading Reader Evaluation. Note the article number for each item, and on this card, circle the rating number that indicates your evaluation of an item. If an article did not interest you, circle the number in the N/A row for that item. Rate your *1-2-3/Symphony* skills below and make comments in the space provided. Thanks. The Editors.

Article No.	1	2	3	4	5	6	7	8	9	10	11	12	13
Excellent	1	6	11	16	21	26	31	36	41	46	51	56	61
Good	2	7	12	17	22	27	32	37	42	47	52	57	62
Fair	3	8	13	18	23	28	33	38	43	48	53	58	63
Poor	4	9	14	19	24	29	34	39	44	49	54	59	64
N/A	5	10	15	20	25	30	35	40	45	50	55	60	65

Article No.	14	15	16	17	18	19	20	21	22	23	24	25
Excellent	66	71	76	81	86	91	96	101	106	111	116	121
Good	67	72	77	82	87	92	97	102	107	112	117	122
Fair	68	73	78	83	88	93	98	103	108	113	118	123
Poor	69	74	79	84	89	94	99	104	109	114	119	124
N/A	70	75	80	85	90	95	100	105	110	115	120	125

LOTUS
COMPUTING FOR MANAGERS AND PROFESSIONALS

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Comments ______________________

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Poor	69	74	79	84	89	94	99	104	109	114	119	124
N/A	70	75	80	85	90	95	100	105	110	115	120	125

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NEW PRODUCTS

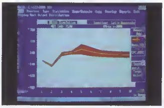
Symantec Corp. Improves Q&A's Database-File Support on a Local Area Network

Q&A VERSION 3.0 PROVIDES MULTIUSER ACCESS TO a *Q&A* database on a LAN. Its record-locking feature prevents more than one user from accessing a database record simultaneously. The Version 3.0 word processor offers wider laser-printer support and adds nine more fonts. For mail-merge operations, it pops up a list of database field names to select from. The program also prints *1-2-3* graphs with higher resolution than previous versions.

Q&A Version 3.0 requires 512K of RAM and runs on IBM PC and compatible computers. It costs $349; from Symantec Corp., 10201 Torre Ave., Cupertino, CA 95014-2132; 800-441-7234, in Calif. 800-626-8847.

CIRCLE 10 ON READER SERVICE CARD

1-2-3 Add-In Permits Complex Risk Analysis in Spreadsheets; Adds 30 Probability-Distribution @Functions



@RISK HELPS YOU SET up and perform risk analyses and Monte Carlo simulations on your *1-2-3* worksheets. An *@Risk* analysis can generate tabular and graphic probability distributions (ranges of values in one cell and their likelihoods) involving 1,000 worksheet cells. Thirty new @functions allow you to specify simple and complex probability distributions. The program supports Monte Carlo and Latin Hypercube sampling techniques. *@Risk* displays graphs overlaid on the worksheet, histograms, and cumulative curves for printing or exporting to other graphics packages.

@Risk uses 60K of RAM and runs on IBM PC or compatible computers with at least 512K of RAM. It requires *1-2-3* Release 2/2.01 and an IBM VGA, EGA, or CGA or a Hercules graphics adapter. It costs $395; from Palisade Corp., 2189 Elmira Rd., Newfield, NY 14867; 607-564-9993.

CIRCLE 11 ON READER SERVICE CARD

READER EVALUATION

Your comments about *LOTUS* magazine help us bring you the best editorial product each month. To rate the articles in this issue, scan the list below and refer to the READER EVALUATION section on the Reader Service card to the left. Identify the number corresponding to each article or feature, then circle the number on the card that reflects your rating.

NUMBER	TITLE	PAGE
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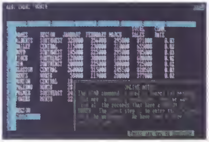
2	IDEAS & TRENDS	11
3	1-2-3 MACROS Can You Relate?	24
4	SYMPHONY MACROS Faster Macros	34
5	ACCOUNTING With Sincere Depreciation, Part 2	44
6	FORECASTING Prediction Intervals for Regression Models	50
7	FEATURE A Beginner's Guide to Global Settings	56
8	FEATURE Four *1-2-3* Database Add-Ins	64
9	FEATURE Small-Business Series: Accounts Receivable	70
10	GOOD IDEAS	77
11	Q&A	80
12	GRAPHICS Creating Recurring Charts from Your Worksheet	89
13	REVIEW *The Worksheet Utilities*	96
14	REVIEW *Note-It Plus*, *Noteworthy*, and *SmartNotes*	98
15	REVIEW *@functions#1*	102
16	NEW PRODUCTS	113
17	ESSAY A Day at the Races with *1-2-3*	124

AND COMING NEXT MONTH:

- **Three New Graphs for *1-2-3***
- **Small-Business Series: Receivables Journal**
- **Accounting: Correlation Matrix**
- ***1-2-3* Macros: Letters to the Macros Editor**

Seminar-on-a-Disk Teaches You How to Set Up a 1-2-3 Database with Step-by-Step Business Exercises



SEMINAR-ON-A-DISK FOR DATA BASE MANAGEMENT is geared toward someone with at least rudimentary worksheet skills. The training disk and accompanying manual develop database skills using the *1-2-3* Data Query Find and Data Query Extract commands. Self-paced, business-oriented exercises teach you how to create orderly, accessible databases.

The program runs with *1-2-3* Release 1A or higher and requires an IBM PC or compatible with DOS 2.0 or higher. It costs $59.95; from InfoSource, 114 Park Ave. S, Suite C, Winter Park, FL 32789; 407-645-2995.

CIRCLE 12 ON READER SERVICE CARD

Keyboard Attachment Simplifies Using Popular Software Packages; Guides User Through Commands

THE SIMPLIFIER IS A SUPPLEMENTAL KEYPAD FROM which you can select a simplified set of software commands. The unit translates your selections into keystrokes for *1-2-3, MultiMate Advantage, Microsoft Word, dBase III, DisplayWrite 4*, or *WordPerfect*. For the novice, the unit gives tips on using the software application and tells how to proceed with each task. For the experienced user, it provides shortcuts through a program. You can configure macros for any software package to use with The Simplifier.

The $599.95 Simplifier uses no RAM and runs with '286- and '386-based computers. Each program-specific software cartridge costs $79.95; from Penguin Products, 5 Old Windsor Rd., Bloomfield, CT 06002; 800-648-8433, in Conn. 203-243-8433.

CIRCLE 13 ON READER SERVICE CARD

Self-Study Course for Advanced 1-2-3 and Symphony Users Emphasizes Building Macros

"ADVANCED TRAINING FOR 1-2-3 AND SYMPHONY" covers macros, @functions, and financial analysis in *1-2-3* Release 2/2.01 and *Symphony* Release 1.1 or higher. More than half the course is devoted to macros (using subroutines, IF-THEN and FOR-NEXT statements, menus, and *Symphony*'s Learn mode). The section on @functions includes using date and string functions, lookup tables, and net present value functions.

The training course includes four audiocassette tapes, a data disk, and a reference guide. It costs $129; from FlipTrack Learning Systems, 999 Main St., Glen Ellyn, IL 60137; 800-222-3547, in Ill. 312-790-1117.

CIRCLE 14 ON READER SERVICE CARD

1-2-3 Template for Figuring Your 1988 Federal Tax Withholding

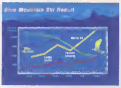
A CPA DESIGNED *TAX ESTIMATE* TO HELP YOU DEtermine the amount your employer should withhold from your pay so that you meet your 1988 federal tax obligation. The program includes 1988 tax-law changes; for example, Schedule A reflects the fact that only 40% of consumer-loan interest will be deductible. *Tax Estimate* produces a printout that resembles a federal tax form, which you can use as a base from which to fill out next year's return.

Tax Estimate costs $19.95 and uses 60K of RAM. It requires *1-2-3* Release 2/2.01 and runs on IBM PCs and compatibles. From Jerry A. Witkovsky, CPA, 2919 Cripple Creek Trail, Grapevine, TX 76051; 817-481-5258.

CIRCLE 15 ON READER SERVICE CARD

CURT BERNER

Of all the graphics you can create with Freelance Plus,


Blue Mountain Ski Resort

Continental Sales Districts

New Sales Districts

Monthly Sales Report

Catalog Sales

Corporate Focus on the Customer

New Pavilion

25 Years Experience

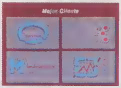
The Customer Benefits

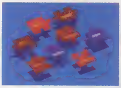
New Jilbays

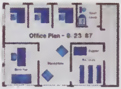
Efficient Channels

European Operations

VCR Market Growth


Major Clients




Office Plan - 8.23.87

We Offer Service!

Insurance

Banking

Accounting

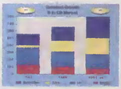
Service

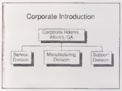
Consulting

Marketing

Investment

Real Estate



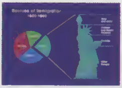

Corporate Introduction

Corporate Hdqrtrs Atlanta, GA

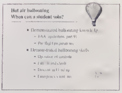
Service Division

Manufacturing Division

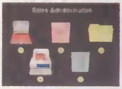
Support Division


Sources of Immigration

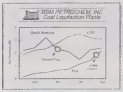
Heavy Equipment Sales

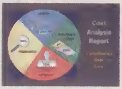

Hot air ballooning
When can a student solo?

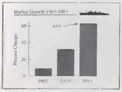
- Demonstrated ballooning knowledge
  - FAA regulations, part 91
  - Pre-flight preparation
- Demonstrated ballooning skills
  - Operation of controls
  - Lift-off and climb
  - Descent and landing
  - Emergency situations

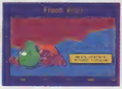

Sales Administration

Cost Reduction


DSM PETROCHEM, INC
Coal Liquifaction Plants

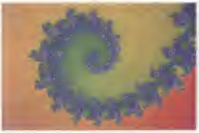

Cost Analysis Report


Market Growth 1965-1985


Fresh Fruit

Transatlantic Industries

Low-Cost VGA Board Provides High and Low Resolutions; Works with Most Monitors and Software Applications



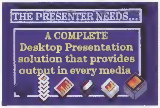
THE DESIGNER VGA BOARD EMULATES THE IBM video Graphics Array standard, which provides a 16-color display with 640-by-480-pixel resolution, and works with most PC applications software. The board also provides a 256-color display with 640-by-480-pixel resolution, 16-color or 256-color displays with 800-by-600-pixel resolution, and a 16-color display with 1,024-by-768-pixel resolution.

The Designer VGA runs on the IBM PC XT, PC AT, and compatible computers. You can use it with the IBM PS/2, multisync, and VGA-compatible, single-frequency monitors. It costs $445; from Orchid Technology, 45365 Northport Loop W, Fremont, CA 94538; 415-683-0300.

CIRCLE 16 ON READER SERVICE CARD

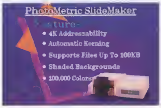
Film Recorder Makes Slides for Business Presentations; Is Compatible with Popular Graphics Packages

THE PHOTOMETRIC SLIDEMAKER IS A 35MM FILM unit that makes 4,000-by-4,000-line-resolution slides in 1,000 simultaneous colors from your PC. It provides full-color on-screen preview, automatic kerning, and shaded backgrounds. It works with more than 40 graphics packages, including *Lotus Freelance Plus, Harvard Graphics,* and *Micrografx Graph Plus.*



THE PRESENTER NEEDS...

A COMPLETE
Desktop Presentation
solution that provides
output in every media



PhotoMetric SlideMaker

ature

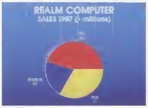
- 4K Addressability
- Automatic Kerning
- Supports Files Up To 100KB
- Shaded Backgrounds
- 100,000 Colors

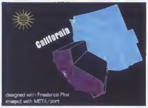
Photometric Slidemaker ($4,495) runs on IBM PCs and compatibles and requires either the $1,695 ColorMetric Graphics Card or the $4,595 VideoShow system. From General Parametrics Corp., 1250 Ninth St., Berkeley, CA 94710; 800-556-1234 ext. 234, in Calif. 800-441-2345 ext. 234.

CIRCLE 17 ON READER SERVICE CARD

Utility Lets Volume Producers of Graphics Use High-Resolution Devices

THE *GRAPHX PROFESSIONAL IMAGING SOLUTION* IS A set of four software utilities that enable you to produce enhanced graphics from packages such as *1-2-3, Symphony, Freelance Plus, Harvard Graphics, Picture It,* and *Micrographx Windows Draw.* The utility's software rasters (image-making drivers) support high-resolution devices such as ColorMaster's thermal printer and film recorders from Matrix and Lasergraphics, which can provide 16 million colors and seven typefaces. Included are image files that provide subtle background shadings and patterns for your graphs.





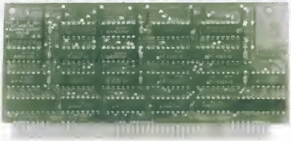
The utilities cost $245 each ($795 for all four) and run on '286- or '386-based computers. From Graphx, 41 Pleasant St., Methuen, MA 01844; 508-975-5424.

CIRCLE 18 ON READER SERVICE CARD

Low-Cost Add-On Board Ups the AT's RAM to 640K; Maximizes Expanded and Extended Memory

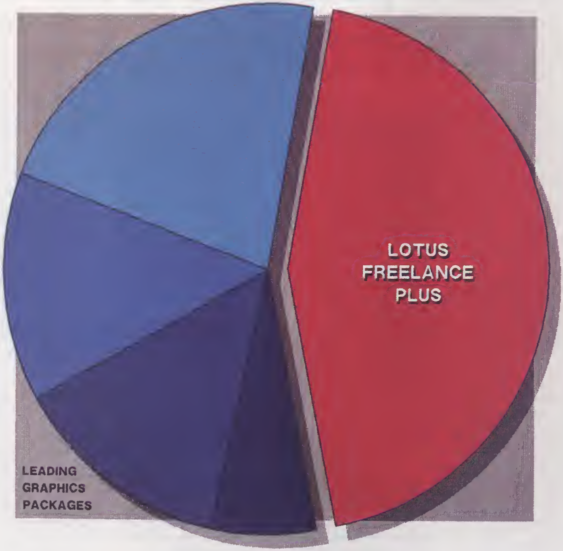
THE TOPHAT II PROVIDES THE 128K OF MEMORY NECessary to bring the standard 512K IBM PC AT and compatibles up to 640K of RAM. The Tophat II permits maximum use of the AT's built-in expanded and extended memory because none is needed to "backfill" the missing 128K of conventional memory. The manufacturer claims the board is so easy to install into a 16-bit slot on your AT that it requires only a four-page manual.

The Tophat II add-on memory board runs with the IBM PC XT 286, PC AT, and compatible computers. It costs $145; from Boca Research, 6401 Congress Ave., Boca Raton, FL 33487; 407-997-6227.



CIRCLE 19 ON READER SERVICE CARD

This is the one we're particularly proud of.



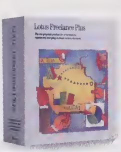
Lotus® Freelance® Plus is the most versatile graphics package for the PC. And that's probably why it's the #1 selling business graphics package on the market.*

Freelance Plus lets you create everything from data-driven charts like bar charts, to graphics based on ideas like flowcharts. And Freelance Plus is the complete graphics solution, because you get all the tools you need for creating effective business graphics in a single package.

What's more, Freelance Plus is compatible with other Lotus software, like 1-2-3,® Symphony,® and Manuscript.® And it's incredibly easy to use.

Find out why Freelance Plus has the biggest slice of the pie. To order a $10 demo kit, call 1-800-345-1043 and ask for demo kit ADT-1658.

Lotus Freelance Plus



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*Based on national audits conducted by Audits & Surveys, Inc., May–December 1987

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What does it really take to be a desktop publisher? How is desktop publishing changing? What can the new products do? And what do they cost?

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CIRCLE 132 ON READER SERVICE CARD

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A DAY AT THE RACES WITH 1-2-3

BY DANIEL SELIGMAN

The latest spreadsheet problem to hit our household goes back to January 2, 1988, when something quite amazing happened: I hit a stupendous trifecta. In the ninth race at Aqueduct (New York City's winter track), I picked the first three horses to cross the finish line, in the correct order. Since the steeds in question had gone off at, respectively, 21-1, 73-1, and 11-1, my winning ticket (on a $2 bet) was worth more than $14,000 before taxes.

The taxes, alas, were onerous. Pursuant to discriminatory federal legislation that has a prejudicial impact on the less-risk-averse classes, racetracks are required to withhold 20% on all winning tickets that are (a) worth $1,000 or more and (b) represent payoffs at or greater than 299 to 1.

Furthermore, there is this off-track-betting tax problem. I had, as usual, bought the winning ticket via a telephone account at a New York OTB office. The folks there appropriate an additional slice that works out—they claim—to 5%. This slice is, of course, on top of the 17% track "takeout" (the money taken out of the betting pools before winners are paid off).

The OTB telephone operator who provided the tax totals was sympathetic and helpful. Main message: "What you need, pal, is a Super Club account."

Although not yet immortalized in *Doug Cobb's 1-2-3 Handbook* or similar guides, the Super Club proposition aches to be dealt with by spreadsheet financial functions. In joining the Super Club, it turns out, you make the following deal: You lateral-pass $1,000 to OTB. The money is retrievable at any time by you or your estate, but as long as your friends at OTB hold the money, they agree to forego the 5% tax and any OTB service charges. So the question then becomes: Are you a big enough and/or skillful enough bettor so that the savings represented by avoidance of the tax gives you an acceptable return on the grand?

Like other questions that seek to relate a stream of future payments to an initial investment, this one is amenable to internal-rate-of-return analysis, and I instantly reached for Doug Cobb's section on the @IRR function. Then I bumped into the obvious problem: How do you think about future payments whose size and timing depend on your ability to beat the horses? Cobb being no help on that one, I decided after some dithering to plug into the formula the money I would have saved each month in 1987 if I'd been in the Super Club.

However, it was not immediately clear what the savings would have been. My elaborately constructed *1-2-3* gambling database showed some OTB action on 71 days in 1987 and also showed that I had had at least some winning tickets on 33 of those days. Those recorded winnings, of course, were after paying the OTB tax. But in trying to calculate what they would have been in the absence of the tax, I couldn't just add back 5%.

The problem is that the OTB folks are really slicing away more than they claim. They sneak in the final slice via what they call breakage. When the 5% tax works out to some odd amount, they round it up to the next multiple of 20 cents. If a $2 ticket at the track pays $10, the 5% tax is 50 cents, which OTB nonchalantly rounds up to 60 cents. In that case, you will observe, the alleged 5% tax ends up being 6%. On a ticket that pays $4.40, it works out to over 9%. I spent an hour trying to produce a formula for rounding up to 20-cent multiples before finally coming up with a series of nested @IF functions that laboriously did the job. Naturally, I then found a much neater solution, using the @INT function, in Charles W. Kyd's article in the April issue. Typical, eh?

Breakage is a swindle, but it is not too burdensome to winners of exotic bets (daily doubles, exactas, trifectas), which have huge payoffs and leave the bettor not caring much about the odd 20 cents. Since my own bets are overwhelmingly exotic, I ended up with an estimate that my 1987 OTB vigorish averaged 5.25%. An @VIG function in *1-2-3* wouldn't hurt.

Things got easier after that. I assigned each of the 33 winning days to the month in which it had occurred, added 5.25% to each monthly total (an exercise that still left June at zero), and invoked the @IRR function. As everybody knows, users of this function are asked not only to supply the initial payout and subsequent paybacks but also to make a guess about the likely rate of return. My own guess was a monthly rate of 1.53%, but I was instantly informed by *1-2-3* that the correct figure was 2.33%. That compounds to an annual rate of 31.8%—definitely higher than the marginal cost of capital around our house—and leaves the case for the Super Club looking clearly invincible. ■

Daniel Seligman writes Fortune *magazine's "Keeping Up" column.*

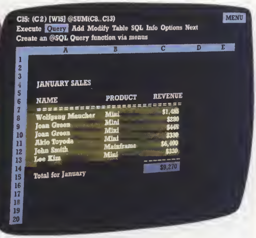
DAVID MOYERS

ORACLE® turns Lotus 1-2-3 into a full function database

ORACLE, the world's best selling relational database, now works from inside your Lotus 1-2-3 spreadsheet program. Familiar 1-2-3 menus guide you through creating, modifying and retrieving data in your database. You can even perform ORACLE database functions automatically using standard Lotus macros and formulas. The point is…

NAME	PRODUCT	REVENUE	DAY
Wolfgang Maucher	Mini	1485	05-Jan-88
Joan Green	Mini	280	15-Jan-88
Joan Green	Mini	445	16-Jan-88
Akio Toyoda	Mini	330	18-Jan-88
John Smith	Mainframe	6400	19-Jan-88
Lee Kim	Mini	330	28-Jan-88
John Smith	Mini	810	03-Feb-88
John Smith	Mini	1025	07-Feb-88
Francois Calvet	Micro	32	12-Feb-88
Akio Toyoda	Mini	760	16-Feb-88
Susan Williams	Micro	22	23-Feb-88

Store unlimited amounts of data in your ORACLE database



```
C15: (C2) [W15] @SUM(C8..C13)                               MENU
Execute Query Add Modify Table SQL Info Options Next
Create an @SQL Query function via menus
           A                 B              C        D      E
 1
 2
 3
 4  JANUARY SALES
 5
 6  NAME               PRODUCT       REVENUE
 7  ===================================
 8  Wolfgang Maucher   Mini           $1,485
 9  Joan Green         Mini             $280
10  Joan Green         Mini             $445
11  Akio Toyoda        Mini             $330
12  John Smith         Mainframe      $6,400
13  Lee Kim            Mini             $330
14                                 ---------
15  Total for January                 $9,270
16
17
18
19
20
```

Use all the features of Lotus 1-2-3 to analyze, report, and graph data in your ORACLE database.

> *For a price that's almost unbelievable, this add-in brings the full functionality of a powerful Structured Query Language (SQL) relational database-management system (DBMS) to the PC industry's most popular spreadsheet: Lotus 1-2-3… …But perhaps the best news is that Oracle for 1-2-3 is very easy to learn and use. Anyone already familiar with 1-2-3 already knows how to use Oracle for 1-2-3.*
>
> *PC Week, April 5, 1988*

…If you already know how to use Lotus 1-2-3, then you already know how to use ORACLE, the world's most powerful database.

By putting data into a database, Lotus 1-2-3 spreadsheet's performance is improved, long re-calcs are eliminated and your worksheets are smaller and more manageable.

- Have ORACLE for 1-2-3 build the query automatically for you and retrieve just the data you need.
- A single command automatically creates new database tables from data in any existing worksheet.
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And if you make a mistake, you can…

- Undo changes.

Or save your changes permanently in your database and worksheet.

- Share the same data in multiple worksheets, or even across a network of different computers with many users.

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Act now, get a 30-day moneyback guarantee and we'll pay sales tax and shipping. So fill out and mail the attached coupon, or call today. You can also purchase ORACLE for 1-2-3 at your favorite computer store. **$199*** ***Yes,*** *this includes the full function ORACLE database.*

Dear Oracle,

ORACLE for 1-2-3 • Oracle Corporation
20 Davis Drive • Belmont, CA 94002

Yes, I have an ☑ 80286/80386 PC running ☑ DOS 3.0+ and ☑ Lotus release 2.01. I also have ☑ 640KB of RAM, plus either ☑ 1MB of extended memory or I will reassign 1MB of my expanded memory as extended memory. Please send me the database I already know how to use — the ORACLE database add-in for Lotus 1-2-3, on ☐ 5¼" or ☐ 3½" disks. Enclosed is my ☐ check, or ☐ VISA ☐ MasterCard ☐ American Express credit card authorization for $199.*

PRINT NAME DATE
COMPANY TITLE
STREET *(No PO boxes please)*
CITY STATE and ZIP
PHONE
CREDIT CARD NUMBER
CARD EXPIRATION DATE
SIGNATURE **LOTUS**

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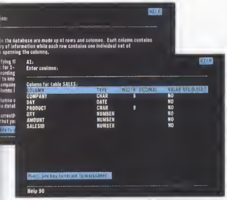
dd-in for Lotus 1-2-3

the number one database for mainframes, minis, workstations and PCs. In fact, Software Digest recently ranked ORACLE the most powerful and versatile relational database for the PC.

Now ORACLE for 1-2-3 brings the power of ORACLE to your 1-2-3 spreadsheet. Perform sophisticated queries in a matter of seconds. Create, delete or alter tables and views. Produce management reports and graphs. All the power you'd expect in a serious mainframe database is ready to address your most demanding needs.

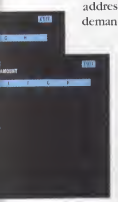


```
A1:
Enter columns:

Column for table SALES:
COLUMN          TYPE     WIDTH  DECIMAL  VALUE REQUIRED?
COMPANY         CHAR     8               NO
DAY             DATE                     NO
PRODUCT         CHAR     9               NO
QTY             NUMBER                   NO
AMOUNT          NUMBER                   NO
SALESID         NUMBER                   NO

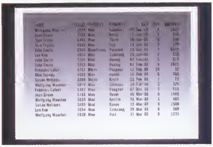
Press any key to return to worksheet
Help 90
```

Call on context-sensitive help when you need it.



With ORACLE, you can build database applications using 1-2-3.

Create custom report templates and data entry forms.



Enter your data just once and store it in your central ORACLE database.

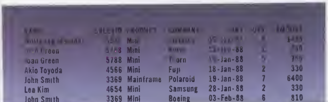
Add a few macros or formulas, and you have a powerful database application that anyone can use at the touch of a key.

Access distributed data

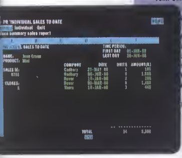
ORACLE for 1-2-3 is a true distributed database with full networking capability that lets you access and update data anywhere on your organization's information networks.

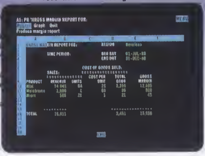
Use ORACLE as a central database server on a LAN to unite all your 1-2-3 users and their information. Or use 1-2-3 to manage ORACLE databases on remote minis and mainframes, even to connect with other relational databases like IBM's DB2.

Analyze the same data in many worksheets and share it among multiple users.

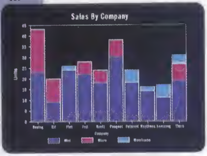


```
Akio Toyoda    4566  Mini       Fuji      18-Jan-88  2   330
John Smith     3369  Mainframe  Polaroid  19-Jan-88  7  6400
Lea Kim        4654  Mini       Samsung   28-Jan-88  2   330
John Smith     3369  Mini       Boeing    03-Feb-88  6   810
```





```
A1: PR 'GROSS MARGIN REPORT FOR:
Report  Graph  Quit
Produce margin report
```



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You can't afford your investment in database technology to run out of power when you least expect it. ORACLE makes sure that when you solve today's information problems, you solve your future ones, too. As your databases grow and your needs increase, you can use other ORACLE application tools to access your ORACLE database. And if your database becomes too large for your PC, you can move it to any of hundreds of other computers running ORACLE today.

A software first

ORACLE for 1-2-3: Everything you need to transform your copy of 1-2-3 into a full-function database. For the very first time, you can build secure, production applications in an environment you already know how to use. It's an opportunity you can't afford to miss.

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ORACLE database a

ORACLE: The database inside 1-2-3

When you use a spreadsheet to do the work of a database, you've got two choices. You can put all your data in one large, unmanageable worksheet and face sluggish performance and memory problems. Or you can create small, multiple worksheet files, forcing yourself to duplicate data, risk inconsistencies, and waste disk space.

There is a better solution. ORACLE database add-in for Lotus 1-2-3 transforms your 1-2-3 spreadsheet into a full-function database.

You already know how to use it

With ORACLE for 1-2-3, you use familiar Lotus menus and formulas to manage your database from inside your worksheet. There's no need to invest your time learning a database product. From the moment you install ORACLE, you are instantly more productive.

Unlimited capabilities

What do you get when you merge the world's leading spreadsheet with the world's leading database? All the capability you'll ever need. Just use 1-2-3 for your analysis and graphics needs and use ORACLE to store and manage your data. It's a powerful combination that delivers a complete solution for information management and business analysis.

Share data efficiently and securely

ORACLE stores your information in a central database that you access dynamically with 1-2-3 menus and formulas. You can use the same data in many worksheets, even share it with multiple users. This avoids data duplication, guarantees consistency, eliminates re-entering data, and provides up-to-the-minute information every time.

Exploit technology advances

Spreadsheets simply aren't designed to handle large amounts of data, constraining you by both the speed of your PC and its available memory. By storing your data on disk and allowing you to select just the data you want into each worksheet, ORACLE solves your memory and performance problems.

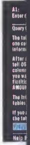
ORACLE takes full advantage of the new generation of personal computers, running on 286 and 386 PCs above the 640K barrier in extended memory. If you already have an EMS memory board, you can easily configure it to support both extended and EMS memory, and continue to use it for handling your large spreadsheets.

Experience the power of SQL

ORACLE delivers a full implementation of SQL, the standard language for relational databases supported by IBM and international standards organizations. ORACLE for 1-2-3 lets you use simple menus to create SQL statements. So you become familiar with the power and simplicity of SQL as you retrieve and manipulate your data in 1-2-3. Once you know SQL, you can enter statements directly into your worksheet.

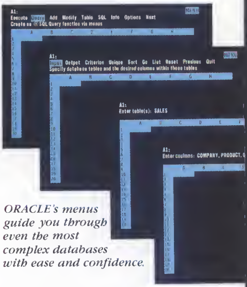
How ORACLE for 1-2-3 Works

ORACLE for 1-2-3 gives you the power of a relational database from within your 1-2-3 worksheet. Access your data with simple menu commands, extracting only the data you need to solve the problem at hand. You can even tell ORACLE to sort and summarize your data automatically. And since you analyze your ORACLE data in a 1-2-3 worksheet, you can produce all the reports and graphs you need.



With ORACLE for 1-2-3, you have the data you want in seconds, in the format you want it. So you spend your time analyzing your data, not figuring out how to get to it. And when you're done, just save your spreadsheet for future use or update your database with the results.

You can even use 1-2-3 to create new database tables. Just enter your data into a worksheet and ORACLE creates the tables with one simple command.


A1:
Execute Query Add Modify Table SQL Info Options Next
MENU
A B C D E F G H
A1:
Input Output Criterion Unique Sort Go List Reset Previous Quit
MENU
A B C D E F G H
A1:
A B C D E
A1:

Create an @SQL Query function via menus

Specify database tables and the desired columns within those tables

Enter table(s): SALES

Enter columns: COMPANY, PRODUCT,

ORACLE's menus guide you through even the most complex databases with ease and confidence.

The power and flexibility of the premier relational database

To meet today's information management needs, you need both power **and** flexibility. ORACLE's unrivaled capabilities have made it

The first DBMS you can use. The last DBMS you'll ever need.

Oracle Corporation has just climbed past Ashton-Tate to become the world's largest supplier of database management software and services. Why? Because the ORACLE® DBMS is the most powerful in the world... and it's just become the easiest to use. In fact, you already know how to use it.

Introducing the ORACLE database add-in for Lotus 1-2-3.

With ORACLE for 1-2-3, you use familiar Lotus menus and formulas to manage your data, without ever leaving your 1-2-3 worksheet. In contrast, dBASE is a procedural language that's hard to learn and harder to use.

ORACLE for 1-2-3 is a true multi-user, networked database. At last, you can share the same, up-to-date information with other users on PC LANs, minicomputers or mainframes. Compare this to dBASE's primitive PC networking capability.

Don't go down in flames. More information about ORACLE for 1-2-3 is contained in the preceding three pages.

ORACLE®

COMPATIBILITY · PORTABILITY · CONNECTABILITY

Call 1-800-ORACLE1, ext. 150 today.